Statement of Resolution of Dispute Issues
Draft Baseline Ecological Risk Assessment
Newtown Creek Remedial Investigation (RI)/Feasibility Study (FS)

This Statement of Resolution of Dispute Issues sets forth my decision on behalf of the U.S. Environmental Protection Agency (EPA) Region 2, with respect to the issues in the dispute resolution proceeding initiated by the members of the Newtown Creek Group (NCG) by Notice of Dispute Resolution dated December 22, 2016 (attached). This decision is issued pursuant to Paragraph 66 of the Administrative Settlement Agreement and Order on Consent for Newtown Creek Remedial Investigation and Feasibility Study (AOC).

The dispute concerns directives to Anchor QEA (AQ) on behalf of the NCG Respondents in an email dated December 8, 2016 (Subject: Final Newtown Creek BERA RTC document; attached) from EPA's Remedial Project Manager Caroline Kwan to AQ, with copies to technical representatives of Respondent New York City, National Oceanic and Atmospheric Administration (NOAA), and EPA.

The Draft Baseline Ecological Risk Assessment (BERA) written by AQ for the Newtown Creek site was submitted to EPA in February 2016. EPA reviewed the document and issued comments on June 11, 2016. The NCG responded to the comments on November 4, 2016, and EPA replied to NCG on December 8, 2016. The NCG then submitted the above referenced Notice of Dispute Resolution.

A Dispute Resolution meeting was held in New Orleans on January 11, 2017 (coincident with the Battelle sediment conference), and it was agreed that the issues outlined in the Notice of Dispute Resolution fell into two categories: 1) technical issues that could potentially be resolved and removed from the dispute through the exchange of additional information and through technical discussions between EPA and NCG, with the participation of Respondent New York City Department of Environmental Protection (NYCDEP), New York State Department of Environmental Conservation (NYSDEC), and Natural Resource Trustees (NOAA and the U.S. Fish and Wildlife Service [FWS]); and 2) technical issues that could not be resolved by such discussions and that would remain in dispute to be decided pursuant to dispute resolution procedures in Article XV (Dispute Resolution) of the AOC.

In addition to the technical issues, the dispute included two administrative issues, one concerning the identity of EPA's dispute resolution official which was resolved between EPA and NCG and removed from the dispute, and one concerning the date for submittal by the NCG of the revised BERA which is decided in this Statement of Resolution of Dispute Issues.

During the Negotiation Period, several of the technical issues were removed from the dispute (as outlined in EPA's email of March 17, 2017 (Subject: Newtown Creek: BERA Dispute Meeting Revised Agenda; attached) to NCG, NYCDEP, and key stakeholders. The final meeting to discuss the issues under dispute for the Newtown Creek BERA was held March 21, 2017 at the offices of Vinson and Elkins, LLP in New York City. Based on a summary submitted to EPA by AQ on March 9, 2017 (BERA Dispute Resolution: Status Summary – March 7, 2017 [referred to as the March 7 status summary]; attached), and a review of the December 22, 2016 Notice of Dispute Resolution, there were four technical issues and one administrative issue that remained unresolved and in dispute by the NCG. These issues are:

<u>Technical Issues</u>

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1. Reference Areas – censoring of outliers;
2. 10-Day sediment toxicity test results – weighted the same as 28-Day test results;
3. Wildlife Exposure Modifying Factors (EMF) – including a range of EMFs; and
4. Selection of tissue thresholds – use of values from the Lower Passaic River Remedial Investigation.

<u>Administrative Issue</u>

5. Due date for submittal of revised BERA

As there had been significant discussion between EPA and AQ on the technical issues since the initial meeting to discuss the dispute, there was a need for both AQ, on behalf of the NCG, and EPA to present their current positions on these issues. During the meeting on March 21, 2017, for each of the four technical issues, AQ summarized NCG's position, followed by EPA's response and summary of EPA's position, which was followed by input from stakeholders FWS and NOAA, and then by Respondent NYCDEP. NYSDEC was not present, but did provide input in an email dated April 4, 2017 (attached). NCG and EPA also discussed the one administrative issue.

Also during the meeting, NYCDEP brought up an issue that had been considered resolved as a technical issue between EPA and NCG. The issue related to the BERA discussion of risk to benthic macroinvertebrates and confounding factors.

Below is a summary of each disputed issue, followed by a summary of the position of the above-referenced parties on each issue, and then by the decision of EPA's dispute resolution official:

Issue 1: Reference Areas

In the December 8, 2016 email EPA directed AQ to compare the Study Area results to the Reference Envelope (all four Reference Areas) and to each of the individual Reference Areas. Prior to making comparisons, EPA recommended that the Reference Area locations be checked for outliers (Reference Area sample locations with elevated levels of contaminants), using an acceptability criterion based on the mean probable effects concentration quotient (mean PEC-Q). NCG's December 22, 2016 dispute letter stated that the screening process was inconsistent with the EPA-approved Phase 2 RI Work Plan, does not reflect the best available science to evaluate exposure to sediment-sorbed contaminants, and will not result in risk management decisions that consider the important anthropogenically caused stressors in the Study Area. In its March 7, 2017 status summary, the NCG also stated that if the mean PEC-Q were to be used as an acceptability criteria that "the average mean PEC-Q should be re-calculated using adjusted Phase 1 Aroclor data" since the NCG "was directed by USEPA to adjust the Phase 1 Aroclor data by a factor of 1.75 to represent total PCB congener concentrations."

<u>AQ/NCG</u> – NCG's position is that the acceptability criterion was supposed to be used to exclude outliers, but that EPA had agreed that AQ could utilize the full Reference Area data set, and provided the following arguments:

- Excluding outliers based on the PEC-Q metric would exclude sample locations with elevated PEC-Q values that did not exhibit toxicity to test organisms.
- EPA did not follow its own guidance to use statistics to identify outliers. AQ cannot figure out how EPA identified outliers.

- The PEC-Q metric is irrelevant and doesn't mean anything with respect to the Reference Areas because the porewater Toxic Units (TU) calculations were nearly all less than 1.0 in the Reference Areas.
- The mean PEC-Q value that EPA directed AQ to use was 0.55, based on Westchester Creek, which is the most industrial of all reference areas.
- The PEC-Q metric is based on bulk sediment, which is not current science. The use of porewater would be more site specific.
- AQ stated that if censoring was to be done, they would agree to use a site-specific adjustment factor of 1.75 to convert 2012 Total PCB Aroclor data to be equivalent to Total PCB congener data.

EPA – EPA's position is that censoring Reference Area data to address outliers is appropriate, and supported by EPA guidance, and provided the following arguments:

- Censoring outliers in background and reference data sets is consistent with Agency guidance and policy, and is supported by EPA's *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (2002).
- Following a standard practice of censoring outliers from data sets, EPA developed a criterion based on methods utilized in literature and standard practices for evaluating reference envelopes. The criterion for the removal of outliers being required for the Newtown Creek Reference Areas is a simple acceptability criterion that allows the range of summed concentrations of detected chemicals to be compared within a data set. The mean PEC-Q was one of the criteria applied during the Reference Area selection process, and assessment of Reference Area data in the BERA is to be limited to those locations that met the criterion.
- The PEC-Q metric was one of the eight criteria used during the selection of Newtown Creek Reference Areas.
- Addressing Reference Envelope outliers is discussed in the literature as early as 1997[1].
- The approach is consistent with other EPA Region 2 sites, including the Gowanus Canal and the Lower 8.3 Mile Passaic River, that used outlier analysis to censor data prior to use in the Reference Envelope. In addition, the PEC-Q metric has been used at other EPA sediment sites across the nation (e.g., Portland Harbor and the Anniston PCB Site).
- The mean PEC-Q value that EPA directed AQ to use, 0.55, was based on rounding up the highest mean PEC-Q value (0.52) calculated by AQ for the four selected Reference Areas (Westchester Creek, Spring Creek, Gerritsen Creek, and Head of Bay).
- EPA recommended using the Phase 2 Total PCB congener data to derive the mean PEC-Q, with no conversion, but would allow the Phase 1 Total PCB Aroclor data to be converted to Total PCB congener data using the site-specific conversion factor.
- EPA does not argue that the use of porewater correlations is scientifically valid. However, it is not intended to be a stand-alone line of evidence, particularly when AQ's porewater correlations do not explain observed toxicity in more than 10% of the

[1] Two examples are: *The Reference Condition: A Comparison of Multimetric and Multivariate Approaches to Assess Water-Quality Impairment Using Benthic Macroinvertebrates*. T. B. Reynoldson, R. H. Norris, V. H. Resh, K. E. Day and D. M. Rosenberg. Journal of the North American Benthological Society, Vol. 16, No. (Dec., 1997),pp. 833-852 and Hunt, et al. 2001. *Evaluation and Use of Sediment Toxicity Reference Sites for Statistical Comparisons in Regional Assessments*, ET&C Vol. 20, No 6.

sediment samples. Using other lines of evidence (e.g., bulk sediment chemistry, use of individual COPECs rather than classes of chemicals, non-aqueous phase liquid (NAPL), principal components analysis followed by factor analysis for all individual contaminants) as part of a weight-of-evidence assessment is current science.

Stakeholders – Each stakeholder present at the meeting, or on the phone was asked for input:
FWS – Agreed that censoring was appropriate, and had no comment on EPA's method.
NOAA – Agreed with EPA and stated that censoring the Reference Area data was critical for the BERA.
NYSDEC – As stated in an email dated April 4, 2017 from Ian Beilby (attached), NYSDEC agrees with recommendations and conclusions as detailed in EPA's March 21, 2017 presentation.

Respondent NYCDEP - Agreed with AQ and does not believe censoring is appropriate, as outlined under Item 5 of their March 17, 2017 memo (NYCDEP Position on BERA Dispute; attached).

Dispute Resolution Decision: Censoring of Reference Area and Reference Envelope outliers is appropriate, and supported by EPA guidance, scientific literature on the use of reference envelopes, and precedence at other similar sediment sites, nationally as well as in Region 2. Through this dispute resolution decision, EPA directs NCG to censor the Reference Area data for outliers using the mean PEC-Q metric as described in EPA's February 21, 2017 email from Stephanie Vaughn to Jim Quadrini (7:25AM, Subject: Re: BERA Dispute Status; attached).

Issue 2: 10-Day Sediment Results

In the December 8, 2016 email EPA directed that the 10-Day sediment toxicity study results be considered in the BERA with the same weight-of-evidence as the concurrent 28-Day sediment toxicity studies. NCG's December 22, 2016 dispute letter stated that because the 10-Day test is a static test with no renewal of the overlying water and because the organisms are not fed during the test, the health of the organisms and performance of the test is impacted, and the results of the 10-Day study are considered to be biased toward low survival.

AQ/NCG – NCG's position is that the 10-Day toxicity study was valid, but disputes that it should be reviewed with the same weight as the 28-Day study, and provided the following arguments:

- Because of the lack of feeding and water renewal, there is more stress on the 10-Day organisms than on the 28-Day organisms.
- Comparing the results of the two studies in the upper part of the creek, there was approximately 10% difference in survival. However, in the lower part of the creek, there was a 50%-60% difference in survival.
- The discontinuity between tests was at least partially due to physical parameters rather than chemical toxicity.
- EPA guidance puts more weight on the sublethal endpoints of the 28-Day study.

EPA – EPA's position is that the 10-Day study is a standard method that has been used by EPA successfully for decades, and is as valid as the 28-Day study, with results that are weighed equally, and provided the following arguments:

- The 28-Day chronic assay measures longer exposure, but the 10-Day acute assay measures the impact of sediment consumption by benthic invertebrates.
- Organisms in the 28-Day study are fed clean laboratory-prepared food, and may eat that preferentially over the contaminated sediment, while the 10-Day organisms have to eat the organic matter in the sediment.
- Any stress that may have been on the Study Area exposures was also on the laboratory control and Reference Area exposures, and the results were control-normalized.
- The 10-Day study should be given equal weight to the 28-Day study, as both provide valid information on different toxicological endpoints.

Stakeholders – Each stakeholder present at the meeting, or on the phone was asked for input:
FWS – Agreed with EPA that equal weight should be given both studies.
NOAA – Agreed with EPA and stated that the 10-Day study is important and should be included with equal weight.
NYSDEC - As stated in an email dated April 4, 2017 from Ian Beilby (attached), NYSDEC agrees with recommendations and conclusions as detailed in EPA's March 21, 2017 presentation.

Respondent NYCDEP – NYCDEP does not know if 10-Day versus 28-Day study is biased one way or another, but thinks that both studies should be included and weighted equally.

Dispute Resolution Decision: Through this dispute resolution decision, EPA directs NCG to include the results of the 10-Day sediment toxicity study in the risk characterization portion of the BERA, giving the 10-Day study results the same weight as the results of the 28-Day study, as part of the weight-of-evidence approach, based on the information provided by EPA in the presentation at the March 21, 2017 meeting. Because AQ found significant differences in survival between co-located samples used in both the 10-Day and 28-Day studies, EPA will also accept a discussion of why NCG believes the two tests differ could be presented in the uncertainty section of the BERA.

Issue 3: Wildlife Exposure Modifying Factors (EMF)

In the December 8, 2016 email EPA directed that the wildlife exposure scenarios in the risk characterization section of the BERA include a seasonal exposure factor of 1 (meaning that wildlife receptors spend all of their time in the Study Area) to bound the high end of the risk estimates, along with a range of exposures (e.g., 0.25, 0.5, and 0.75). In the December 22, 2016 Dispute letter, NCG stated that the seasonal exposures used in the BERA are supported by the literature, and it was not necessary to include an arbitrary seasonal exposure of 1 in the risk estimates. NCG also said that it would be appropriate to include such a discussion of ranges in the uncertainty section of the BERA, not in the risk characterization. In the March 7, 2017 Dispute Summary submitted by NCG, they agreed to include the range of EMFs, but still disputed including it in the risk characterization section.

AQ/NCG – NCG's position is that they would include a range of EMFs in the uncertainty section of the BERA, and provided the following arguments:

- AQ did a rigorous literature review to develop site-specific EMFs.

- EPA's recommendation of EMFs of 0.25, 0.5, 0.75, and 1.0 is a generic, random range.
- AQ's EMFs included site-specific relationships for seasonal use, potential site use, tidal ranges, and tissue consumption from mudflats versus from bulkheads/rocks.
- AQ looked at populations, not a few individuals that may spend all their time on site.
- AQ believes that the inclusion of ranges should not be in the risk characterization section, but only in the uncertainty section of the BERA.

EPA – EPA's position is that the inclusion of multiple EMFs (suggested values of 0.25, 0.5, 0.75, and 1.0 were included in the direction) should be in the risk characterization section of the BERA, and not split between the risk characterization and uncertainty sections, and provided the following arguments:

- Multiple EMFs better represents the potential exposure risks to not just the specific species mentioned in the BERA, but to the feeding guilds for which they are surrogates.
- The EMF of 1 also represents the upper boundary for the risk estimate.
- It is important to discuss the potential range of exposures in the risk characterization section of the BERA. As detailed in the EPA's Ecological Risk Assessment Guidance for Superfund (ERAGS) guidance, to ensure that the assessment not lead to an underestimate of risk, the inclusion of appropriate assessment and measurement endpoints should include species/community/habitat considerations that include the receptor's life history, habitat utilization, behavioral characteristics, and physiological parameters.

Stakeholders – Each stakeholder present at the meeting, or on the phone was asked for input:
FWS – Agreed that EPA's recommendation was reasonable.
NOAA – Deferred to EPA and FWS, but stated some animals in industrial areas will use small areas exclusively for lack of other habitat.
NYSDEC - As stated in an email dated April 4, 2017 from Ian Beilby (attached), NYSDEC agrees with recommendations and conclusions as detailed in EPA's March 21, 2017 presentation.

Respondent NYSDEC – NYCDEP did not express an opinion on this issue, either way.

Dispute Resolution Decision: The use of a range of EMFs is appropriate and allows for a wider range of exposure scenarios, protective of those receptors that are transient and those that are, or will be, permanent residents. A full discussion of the risks associated with site-related exposures is necessary for risk managers to make site-specific decisions. The discussion of the EMFs belongs in the risk characterization section of the BERA. Through this dispute resolution decision, EPA directs NCG to include the range of EMFs proposed by EPA (or an alternate range of EMFs derived by NCG, including EMF = 1) in the risk characterization section of the BERA. A discussion of how the range of EMFs may underestimate or overestimate the risk can be included in the uncertainty section.

Issue 4: Tissue Thresholds

In the December 8, 2016 email, EPA directed that additional information from NCG regarding the methods used to derive toxicity reference values (TRVs) for mammalian, avian, fish, and invertebrate receptors should be provided. On January 20, 2017, AQ submitted a technical memorandum titled *Selection of Wildlife Toxicity Reference Values and Tissue Effects Thresholds* (attached), that explained the derivation of mammalian and avian TRVs. However, EPA again requested additional information on the derivation of fish and invertebrate TRVs. On February 8, 2017, AQ submitted a technical memorandum titled *Newtown Creek Baseline Ecological Risk Assessment: Tissue Screening Levels* (attached), that explained the derivation of fish and invertebrate tissue TRVs. After review of the technical memos, EPA approved the mammalian and avian TRVs that had been derived by AQ. EPA also approved many of the TRVs derived for fish and invertebrate tissue. However, EPA and partner agencies (NOAA and FWS) had previously derived fish and invertebrate tissue TRVs for the Lower 8.3 Mile Passaic River site, a similar contaminated sediment site that is also in EPA Region 2 which already has a Record of Decision. EPA recommended that AQ use the TRVs from the Passaic River site (called critical body residue thresholds for the Passaic River site) for copper, lead, mercury, low molecular weight polycyclic aromatic hydrocarbons (LMW PAHs), high molecular weight PAHs (HMW PAHs), Total PCBs, dieldrin, Total dichlorodiphenyltrichloroethane and metabolites (Total DDx), and dioxin. On March 7, 2017, AQ submitted *BERA Dispute Resolution: Status Summary*, to summarize which issues were still under dispute, and to lay out the ongoing concern. The selection of fish and invertebrate tissue thresholds remained under dispute because AQ did not agree with the use of endpoints other than survival, growth, and reproduction for derivation of TRVs.

<u>AQ/NCG</u> – Explained that AQ supplied EPA with supporting data for the selected tissue thresholds in the BERA, but that EPA was uncomfortable with the fish/invertebrate screening values. AQ provided the following arguments:

- EPA accepted the mammalian and avian tissue threshold methods and values which were determined the same way as the fish/invertebrate values, using a method similar to EPA's method for deriving TRVs in the Ecological Soil Screening Level (EcoSSL) documents.
- AQ used the USACE Environmental Residue Effects Database (ERED) endpoints that were consistent with the BERA endpoints (survival, growth, and reproduction).
- AQ disagrees with the use of endpoints other than survival, growth, and reproduction (e.g., behavior, histopathology).
- AQ used the geometric means of the ERED studies that were based on whole body (as opposed to organ toxicity or histopathology), and only studies that included a single chemical (as opposed to mixtures of chemicals).
- EPA directed AQ to use the Passaic River fish/invertebrate tissue thresholds for the subset of chemicals for which these were available, but said that AQ could use their derivation method for all other chemicals for which fish/invertebrate thresholds were needed.
- AQ applied their robust and appropriate study criteria to the Passaic River values, and none of the studies cited would have made it through AQ's selection process.
- AQ doesn't understand how the Passaic River values were derived, and wants to use the values currently in the BERA.
- There was uncertainty in some of the Passaic River studies used, resulting from back-calculating or conversion from tissue to whole body. If appropriate studies are available they should be used, but EPA should not include biomarkers.

<u>EPA</u> – EPA's position is that the toxicological benchmarks used in the Lower 8.3 Mile Passaic River decision making process were developed with concurrence from EPA, NOAA, FWS, and NJDEP, and were developed following a thorough review of peer-reviewed literature with selection of relevant studies to derive toxicological benchmarks to quantify ecological risk. EPA provided the following arguments:

- Derivation of the Passaic River TRVs is detailed in the *Technical Memorandum, Refinement of Toxicity Values and Development of Critical Biota Residues and Biomagnification Factors (BMFs), Conceptual Site Model/Problem Formulation, Lower Passaic River Restoration Project*, March 3, 2006, which is available online as part of the administrative record for the site.
- The AQ approach did not look at site-specific studies, but at literature-based studies to identify acceptable TRVs for the site.
- When selecting toxicity thresholds using only values for survival, growth, and reproduction, the other effects (e.g., behavior, histopathological, enzyme-linked, life cycle) that can significantly impact survival, growth, and reproduction are ignored.
- ERAGS states that: "Both sensitivity to toxic effects of a contaminant and behaviors that affect exposure levels can influence risks for particular groups of organisms."; and "A contaminant can exert adverse ecological effects in many ways. First, a contaminant might affect an organism after exposure for a short period of time (acute) or after exposure over an extended period of time (chronic). Second, the effect of a contaminant could be lethal (killing the organism) or sublethal (causing adverse effects other than death, such as reduced growth, behavioral changes, etc.). Sublethal effects can reduce an organism's lifespan or reproductive success. For example, if a contaminant reduces the reaction speed of a prey species, the prey can become more susceptible to predation. Third, a contaminant might act directly or indirectly on an organism. Direct effects include lethal or sublethal effects of the chemical on the organism. Indirect effects occur when the contaminant damages the food, habitat, predator-prey relationships, or competition of the organism in its community." These statements support the use of behavioral endpoints when they are directly linked to survival, growth, or reproduction.
- Behavioral and other endpoints have been used at other sediment sites. For example, the Anniston PCB Site (Anniston, Alabama), the Portland Harbor BERA (Portland, Washington), and the LCP Chemical BERA (Brunswick, Georgia) utilized the more sensitive endpoints to derive TRVs.
- The Passaic River values were consensus values derived with the input of EPA's partner agencies and included all relevant toxicity endpoints. A full explanation of how the values were derived can be found in the March 3, 2006 technical memo referenced in the first bullet.
- The more sensitive endpoints should be used where available in the BERA to determine whether there is a relationship between these responses and the observed toxicity.
- Use of the more sensitive endpoints for TRV derivation does not necessarily mean the site remedy will be based on them. During the development of preliminary remedial goals (PRGs) in the FS, the sources of the TRV endpoints may be revisited for the remedy selection. The remedy has to be protective, it does not have to be the most conservative.

- EPA allowed that an acceptable alternative would be to use both the Lower 8.3 Mile Passaic River values and the alternative values derived by NCG to bound the upper end of the risk range.

Stakeholders – Each stakeholder present at the meeting, or on the phone was asked for input:

FWS – Stated that AQ's aquatic screening values are very high (PCBs=23.9 ppm), and that they found values in the Jarvinen and Ankley reference (that was cited for AQ) that were orders of magnitude lower. Additionally, EPA's EcoSSL guidance for deriving TRVs states that the TRV should equal the highest bounded no-observed-adverse-effect-level (NOAEL) below lowest bounded lowest-observed-adverse-effect level (LOAEL) for the appropriate effect group, and this does not appear to have been done in the TRVs developed by AQ. The TRVs developed by AQ are too high.
NOAA – Agrees that FWS suggestion has merit and that AQ's approach is not fully transparent. However, if a process looking at all endpoints cannot be agreed upon then the Lower 8.3 Mile Passaic River approach should be used.
NYSDEC - As stated in an email dated April 4, 2017 from Ian Beilby (attached), NYSDEC agrees with recommendations and conclusions as detailed in EPA's March 21, 2017 presentation.

Respondent NYCDEP – Suggest continued workshops until all parties are satisfied.

Dispute Resolution Decision: Inclusion of the aquatic tissue thresholds developed for and used in the BERA for the 8.3 mile LPRSA is appropriate. The values were developed by EPA in collaboration with NOAA, FWS, and NJDEP following a thorough review of literature with selection of relevant studies to derive toxicological benchmarks to quantify ecological risk. TRVs have been derived in the same manner using toxicity endpoints other than survival/growth/reproduction for several large sediment sites across the nation. Through this dispute resolution decision, EPA directs NCG to include the aquatic tissue thresholds from the Lower Passaic 8.3 Mile Focused Feasibility Study in the Newtown Creek Revised BERA. EPA will also accept the inclusion of NCG's alternative values to provide a range of tissue thresholds and the associated estimate of risk. Use of the TRVs developed using more sensitive endpoints will not necessarily drive the development of PRGs in the FS.

Issue 5: Date for Submission of the revised BERA

AQ – On behalf of NCG said that they would be able to submit a Revised BERA by June 23, 2017 (80 days from the anticipated April 4, 2017 date of this Dispute Resolution Decision).

EPA – EPA initially proposed 60 days, but because of the significant revisions being required to the BERA, EPA will accept AQ's proposed 80 days.

Dispute Resolution Decision: Through this dispute resolution decision, EPA directs NCG to submit the Revised BERA, responsive in full to EPA's comments and directives, including the items agreed upon between EPA and the NCG respondents during the Negotiation Period for the dispute, and the decisions in this Statement of Resolution of Dispute Issues. The Revised BERA shall be submitted to EPA by close of business on June 30, 2017, which is 80 days from the date of this decision. The revised BERA is expected to be submitted in a format that can be approved by EPA. If the Revised BERA is not acceptable to EPA, EPA reserves its right under Section X Paragraph 48 of the AOC to unilaterally modify or develop the BERA. If any issues or concerns arise as NCG is preparing the report that may impact that date, EPA should be notified as soon as is practical.

Additional Issue: Benthic Macroinvertebrates and C19 to C36 Hydrocarbons

On March 16, 2017, Respondent NYCDEP brought up an additional issue for discussion at the March 21, 2017 in-person dispute wrap-up meeting. This issue had been considered resolved by EPA and NCG, as documented in the NCG's March 7, 2017 BERA Dispute Resolution Status Summary. However, NYCDEP did not agree that the issue had been properly resolved and submitted a lengthy set of comments late in the day on Friday, March 17, 2017, before the Tuesday March 21 morning meeting. NYCDEP was concerned in particular with the NCG's assertion that aliphatic hydrocarbons in the range of C19 to C36, originating from combined sewer overflows (CSO), were at least partially responsible for observed toxicity in the sediment bioassays. While NYCDEP did not submit comments on the Technical Memorandum "Benthic Macroinvertebrate Risk Assessment Summary" submitted by AQ on February 2, 2017, EPA allowed NYCDEP to bring up the issue at the meeting to ensure that the City's views on this issue had been considered in connection with the negotiated resolution of this issue.

NYCDEP – NYC's position is that they had issue with the BERA discussion of confounding factors, particularly the explanation of C19 to C36 hydrocarbons, and provided the following arguments:

- AQ supplied the February 2, 2017 Technical Memorandum, and EPA requested additional information for detail and to support AQ's argument, but there was no explanation of the role of C19 to C36 hydrocarbons in toxicity.
- NYCDEP was concerned about oily sediment and its potential impacts on the toxicity studies, and the issue was not addressed.
- NYCDEP stated that rather than waiting for a Revised BERA and then further discussing potential impacts regarding the C19 to C36 hydrocarbon issue, EPA, the Respondents and stakeholders should have continued workshops, EPA should come up with language to address the C19 to C36 hydrocarbons, or the discussion should be removed from the BERA.

NCG – Responded that they submitted a 45-page summary of benthic invertebrates and confounding factors, and EPA agreed that it should be included in the BERA, but that it should contain a robust discussion of all of the other confounding factors along with an examination of bulk sediment chemistry, individual contaminant compounds, and Non-Aqueous Phase Liquid (NAPL). NCG was trying to determine how/if CSOs were involved in observed toxicity.

EPA – EPA's position is that the agreement with the NCG sufficiently addressed the need for further characterization of the confounding factors. The resolution was reached that a more robust discussion would be in the Revised BERA. EPA also stated that when the revised BERA was submitted, all parties, including NYCDEP would be able to review this language and provide further comments. NYCDEP asked for workshops, and EPA stated that it would consider the request.

Dispute Resolution Decision: EPA had previously resolved this issue in a February 17, 2017 email from Stephanie Vaughn to Jim Quadrini of AQ (4:47PM, Subject: RE: BERA Dispute Status; attached) by requiring NCG to revise the BERA to include a robust discussion about other possible reasons for the observed toxicity (including but not limited to bulk sediment comparisons, concentrations of individual compounds, and NAPL). EPA does not agree that additional workshops would be an efficient manner of moving the Revised BERA to completion. Through this dispute resolution decision, EPA directs NCG to revise the BERA as previously agreed.

EPA Dispute Resolution Official

Michael Sivak

Michael Sivak
Chief, Passaic, Hackensack and Newark Bay Remediation Branch
EPA Region 2 Superfund Program

April 11, 2017

LIST OF DOCUMENTS (all attached unless indicated otherwise):

February 1, 2016: *Draft Baseline Ecological Risk Assessment, Remedial Investigation/Feasibility Study, Newtown Creek*. Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2 (not attached).

June 11, 2016: EPA comments on the Draft BERA sent to AQ (not attached).

November 4, 2016: AQ responded to EPA's comments on the Draft BERA (not attached).

December 8, 2016: EPA email reply (Subject: Final Newtown Creek BERA RTC document) to AQ's responses on the Draft BERA.

December 22, 2017: *Newtown Creek NPL Site/Newtown Creek Group Notice of Dispute Resolution regarding the BERA*, submitted to EPA by Waller Lansden Dortch & Davis, LLP (Waller), on behalf of the Newtown Creek Group (NCG).

January 20, 2017: *Selection of Wildlife Toxicity Reference Values and Tissue Effects Thresholds*. Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.

February 2, 2017: *Benthic Macroinvertebrate Risk Assessment Summary*. Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.

February 8, 2017: *Newtown Creek Baseline Ecological Risk Assessment: Tissue Screening Levels.* Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.

February 21, 2017: EPA email reply (Subject: Re: BERA Dispute Status) to AQ's question regarding how to censor Reference Area data.

March 7, 2017: *BERA Dispute Resolution: Status Summary – March 7, 2017*, Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.

March 17, 2017: *Memo from City of New York on NCG BERA Dispute*. Prepared by NYCDEP, emailed by Chitra Prabhu to EPA and stakeholders (Subject: RE: Newtown Creek: BERA Dispute Meeting).

March 21, 2017: *Newtown Creek Superfund Site BERA Dispute Wrap-up Meeting*, Power Point presentation slides prepared by EPA Region 2 for the BERA Dispute Wrap-Up meeting. Forwarded as a pdf file to NCG and stakeholders via 3/21/17 email from Stephanie Vaugh (Subject: RE: Newtown Creek: Dispute Meeting Revised Agenda).

April 4, 2017: NYSDEC email reply (subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment).

December 8, 2016: EPA email reply (Subject: Final Newtown Creek BERA RTC document) to AQ's responses on the Draft BERA.

From: Kwan, Caroline <kwan.caroline@epa.gov>
Sent: Thursday, December 08, 2016 9:53 AM
To: Jim Quadrini
Cc: Weissbard, Ron; Cooke, Daniel W.; Prabhu, Chitra (cprabhu@louisberger.com); Leonard, Edward L.; Vaughn, Stephanie; Nace, Charles; Schmidt, Mark; David Haury; Mehran, Reyhan (NOAA); Tom Schadt; Mintzer, Michael
Subject: Final Newtown Creek BERA RTC document
Attachments: Newtown_EPA_ Response_to_BERA_Comment_Response_2016_12_06.pdf

Jim

Attached to this email, please find EPA's responses (December 2016) to Anchor's August 2016 Response Matrix for the Draft Baseline Ecological Risk Assessment (dated February 2016). Pursuant to Section X, Paragraph 45 of the AOC, please note that EPA disapproves, in part, Anchor's Draft Baseline Ecological Risk Assessment submittal (February 2016) with Anchor's proposed modifications (Anchor's Response Matrix August 2016). EPA directs that Anchor, on behalf of the respondents, submit a modified Draft Baseline Ecological Risk Assessment responsive in full to the attached EPA responses (December 2016). Anchor's resubmittal, responsive to all EPA comments, shall be in redline/strikeout format, and shall be provided by not later than January 23, 2017. If Anchor believes another Response to Comment (RTC) document is warranted, it will be submitted in addition to the revised Draft Baseline Ecological Risk Assessment. As you will note, the required submittal date is 46 days from the date of this email, with EPA allowing extra time beyond the period specified in the AOC to account for the upcoming holidays. If Anchor would like to schedule a meeting or a call to review any of EPA's responses before resubmitting the report, please let me know as soon as possible so I can schedule such a meeting/call with the appropriate people in sufficient time to meet the 46-day time period for responsive submission by Anchor.

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Newtown Creek
Baseline Ecological Risk Assessment Comment and Response Matrix

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
1.	USEPA	6/11/16	General Comments	--	--	1	The report needs to focus on risks posed by CERCLA hazardous substances. Discussions on the non- CERCLA stressors or confounding factors should be eliminated from the report or at least discussed in the uncertainty section. Additionally, in the current report format, uncertainties are presented in each evaluation section. A summary of key uncertainties should be provided in the report.	Disagree	The NCG believes that a discussion of non-CERCLA stressors or confounding factors is important to the interpretation of the risks posed by CERCLA hazardous substances, and should be transparent to the public. Therefore, such a discussion should not be confined to the uncertainty section of the report. See the responses to ID Nos. 58, 139, 228, 250, and 262 for additional information in response to specific comments on confounding factors.	Unacceptable. EPA stands by EPA original Comment. As specified in Dispute Resolution on PFA PF (comment No. 11) dated February 2014, confounding factors analysis is to be presented in the uncertainty section.
2.	USEPA	6/11/16	General Comments	--	--	2	The screening process in the BERA did not follow the process outlined in the BERA Problem Formulation (see page 6 Section 3 Identification of Preliminary COPECs). The COPECs identified in the SLERA TM2 were used as the definitive COPECs in the BERA risk analysis. In this BERA, the maximum concentrations of all detected chemicals in sediment and surface water from Phase 1 and Phase 2 investigations should be compared to screening levels to develop the definitive COPEC list. Subsequently, 95% UCLs of the COPECs should be used in the BERA risk analysis.	Clarification	USEPA may be confused between the risk screening presented in Section 5 of the report and the subsequent quantitative baseline risk assessments presented in Sections 6 through 11. The risk screening presented in Section 5 does follow the process outlined in Section 3 of the BERA PF. The COPECs identified in SLERA TM No. 2 were not used as the definitive COPECs in the BERA risk assessments. The risk screening was re-run, per USEPA's direction, using combined Phase 1 and Phase 2 surface water and sediment data, and for tissue, Phase 2 data. Per USEPA directive, the surface water and sediment re-screens were conducted using USEPA's hierarchy for screening levels. Lastly, as described in SLERA TM No. 1, SLERA TM No. 2, and the USEPA-approved Phase 2 RI Work Plan Volume 1, the risk screening was conducted in steps that included comparing maximum concentrations with screening levels and comparing 95% UCLs with screening levels to identify the final COPECs (see draft BERA report Figures 5-1 through 5-3). The NCG can provide further clarification in the draft BERA report on the distinction between the risk screening (the SLERA) and the baseline risk assessments.	Acceptable.
3.	USEPA	6/11/16	General Comments	--	--	3	Specific comments on the use of the reference areas are included below. All of the data collected from the four reference areas were used as a single reference envelope. Four different reference areas were chosen based upon physical characteristics (e.g., industrial, non-industrial, CSO, limited CSOs) to evaluate these conditions compared to the Study Area. The Study Area needs to be compared to individually to each reference area. Additionally, each data point in the reference areas needs to be screened against the chemical-based acceptability criteria outlined in the BERA Problem Formulation.	Comply/ Disagree	The sample design developed in the approved work plan was based on statistically pooling the data from all four of the reference areas, which were selected by USEPA to represent the range of conditions in the urban environment within which the Study Area is found. See the Phase 2 RI Work Plan Volume 1, on page 70, as follows: *Therefore, based on the results of the Phase 1 data and a review of the guidelines included in Version 5.0.00 of ProUCL, this Phase 2 RI Work Plan Volume 1 includes a minimum of 20 samples or tests in both the Study Area and*	Unacceptable. The statistical comparison of each of the four reference areas to the Study Area is required. Along with the comparisons of each reference area to the Study Area, the proposed sensitivity analysis is acceptable as a potentially valuable line of evidence. NCG correctly cited the language on page 70 of the P2WP Volume 1. However, also as NCG pointed out that the four reference areas were selected by EPA based on two-step process, representing four different areas based on physical characteristics. Having these four distinguished reference areas is important for the BERA to compare the data from the study area to that of each of the reference areas, since each reference area represents four different unique physical characteristics. Thus, the comparison of the study area data to each reference area will provide much more technically sound and complete evaluation so

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									in the reference areas (all reference areas combined)[1]. *This recommendation applies to the measurement of all CERCLA hazardous substances and conventional parameters in surface water, sediment, sediment porewater, sediment toxicity tests, bioaccumulation tests, benthic community assessments, and tissue. For most elements of the program, the sample sizes exceed this target value to ensure adequate spatial coverage in the Study Area and meet DQOs for other elements of the Phase 2 investigation (e.g., point sources or modeling).* Therefore, while the NCG believes that all data from all reference areas should be pooled for comparison with the Study Area, the NCG will conduct a sensitivity analysis on the outcome of the benthic community analyses and sediment toxicity test results using data for each of the four reference areas. Regarding screening each data point against chemical-based acceptability criteria, the NCG provided its rationale for using all the data from all four reference areas, in a March 3, 2016 memorandum to USEPA. The four reference areas were selected by USEPA as the result of a two-step process presented in the Phase 2 RI Work Plan Volume 1 that consisted of screening against the acceptability criteria including generic sediment quality guidelines in the form of probable effect concentrations (PECs). As noted in the draft BERA, the NCG believes it is not appropriate to screen these data against generic sediment quality guidelines given the availability of site-specific data including porewater data (Burgess et al. 2013). That said, the four reference areas were sampled in the Phase 2 field program and were used in the BERA. There is no discussion in the Phase 2 RI Work Plan Volume 1 regarding use of any two-step process after the Phase 2 field program was completed or after the BERA analyses were completed, to evaluate whether individual reference area stations sampled in the four reference areas meet the selection criteria. The Phase 2 sample design was to use each reference area in its entirety to reflect the full range of physical, chemical, and biological conditions within each of the four reference area categories.	that an effective and efficient remedial risk management can be made for the site. During the analysis of reference area data, comparisons should be made with reference area outliers removed (i.e., those stations that do not meet the chemical criteria established during the reference area selection). An additional comparison using all of the data for a single reference can be included during the discussion or uncertainty if desired.
4.	USEPA	6/11/16	General Comments	--	--	4	Weisberg Biotic Index was used as a metric for evaluating benthic impacts. Although this is a robust metric, summing the individual measurements to obtain this or any other individual metric score may obscure important differences between the site and reference areas. Additional discussion and evaluation of individual metrics, such as abundance, number of taxa, dominant taxa, should therefore also be included. A weight-of-evidence	Clarification	The BERA presented information on individual WBI metrics in Section 8.3.2.3. Further evaluation of the individual metrics is underway, the findings of which will be discussed in the revised BERA. See also response to ID No. 228. A weight-of-evidence approach will be used for the SQT that integrates each leg of the SQT.	Acceptable

[1] The one exception to this is caged bivalves, for which ten samples (plus one replicate) will be collected in the Study Area. The proposed program was provided to USEPA on February 28, 2014. USEPA provided comments on this program on March 27, 2014.

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							approach, for each leg of the sediment quality triad (SQT; chemistry, toxicity, community assessment) should also be included in the assessment, where applicable.			
5.	USEPA	6/11/16	General Comments	--	--	5	Selected TRVs, screening thresholds and alternative screening levels were used in screening and risk characterization in the BERA. In most cases, no rationale was given for the selected values. Tables must be presented listing values from all literature/studies reviewed and evaluated, with rationale for the selection or rejection of each value in all media, so that the values derived are transparent to readers/reviewers. Due to the lack of supporting documentation, the values presented in this version of the BERA were unable to be confirmed as appropriate. EPA will review the supporting documentation when it is submitted and provide input on the acceptability of the values. Submitting a technical memorandum focusing on the toxicity values used in the BERA may be advisable.	Clarification	Per USEPA directive, the surface water and sediment re-screens in Section 5 were conducted using USEPA's hierarchy for screening levels. The screening level TRVs used to evaluate wildlife are the same as those presented in SLERA TM No. 2. As is typical of a baseline risk assessment, alternative thresholds were selected as applicable. Alternative thresholds are selected for a number of reasons including: thresholds that are region specific rather than generic screening levels or benchmarks, thresholds that use LOAELs as opposed to NOAELs as used in the SLERA, thresholds that can be updated with new effects data reported in the peer-reviewed literature, or thresholds that are more applicable to the species being evaluated than the screening level value used. Further supporting information, where applicable, will be provided in a revised draft of the BERA report.	Partially acceptable. Addition of "further supporting information" is acceptable but it is still unclear if requested detailed table will be provided. These tables need to be provided per EPA's comment. Please provide all supporting information in the text/tables/appendices explaining how TRVs were derived.
6.	USEPA	6/11/16	General Comments	--	--	6	It is inappropriate to use geometric means of NOAELs and LOAELs as screening levels or TRVs. NOAELs and LOAELs should be used as evaluation criteria. Revise all tables and text where geometric means were presented.	Clarification	For the fish and wildlife screen, the NCG believes that the use of the geometric means of the NOAELs from EcoSSL is appropriate for the screening step in a CERCLA BERA and is consistent with the approach used by USEPA in EcoSSL to develop NOAEL-based TRVs for screening purposes (USEPA 2005a). Similarly, the NCG believes that the use of the geometric mean of the LOAELs is appropriate for the TRVs in the baseline assessments because, statistically, this value describes the central tendency of the datasets. A discussion will be provided in the uncertainty section of the BERA on the sensitivity of the risk estimates to using alternative LOAELs.	Partially acceptable. Sensitivity discussion is acceptable, but where data allow, appropriate NOAELs and LOAELs (not geo means) should be selected as TRVs. Appropriateness of TRVs should consider test species (relative to selected receptors), test endpoints, route of exposure, etc.
7.	USEPA	6/11/16	General Comments	--	--	7	NYSDEC sediment screening levels (1998, 1999, and 2004) used in the report are outdated. The most recent version (Screening and Assessment of Contaminated Sediment dated June 24, 2014) should be used. EPA had clearly directed NCG to use this updated NYSDEC sediment guidance in several occasions both verbally and in writing (email from Kwan to Haury, dated September 25, 2014).	Clarification	As presented in Table 5-2, the NYSDEC June 2014 sediment guidance was used. NYSDEC 1998, 1999, and 2004 refer to the sources used for the NYSDEC surface water screening levels, not sediment screening levels. BERA Table 5-2 presents the NYSDEC (2014) Saltwater Sediment Guidance Values (mg/kg) normalized to 1% TOC. These were calculated using information in Appendix D of NYSDEC (2014). Appendix D of NYSDEC (2014) presents the basis and calculation of sediment screening levels and includes the SW Class SGVoc (µg/gOC). For chlordane, the NYSDEC (2014) Appendix D value (0.421 µg/gOC) is incorrectly calculated and should be 3.165 µg/gOC. Therefore, the information in Table 5-2 will be updated to reflect the correct sediment screening level for chlordane of 0.0316 mg/kg.	Acceptable
8.	USEPA	6/11/16	General Comments	--	--	8	The report used the phrase "posing uncertain risk" for the impact of "uncertain COPECs" such as chemicals which lack screening levels and chemicals for which the	Agree	Terminology will be changed where appropriate.	Acceptable

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							reporting limits exceed the screening levels in all media on risks. Revise “posing uncertain risk” to “risk may be underestimated” throughout the report. Additionally, make sure to be consistent with the terminology used, whether “uncertain contaminants” and “uncertain COPECs”.			
9.	USEPA	6/11/16	General Comments	--	--	9	There was no attempt to relate porewater chemistry to sediment chemistry. Since risk management decisions are typically based on sediment concentrations, this is an important analysis to conduct. Porewater analysis focuses on PAH toxic units and an approach for some metals (includes only divalent metals and excludes arsenic, chromium and mercury) which ignores all the additional information in the sediment chemistry data. Revise the text.	Clarification	The NCG recognizes the importance of relating porewater chemistry to sediment chemistry to develop PRGs and evaluate remedial alternatives. However, because of the complexity of the site, general descriptions of the relationship between porewater chemistry and sediment chemistry in the BERA would be of little use toward meeting these two objectives (see the response to ID No. 29). Meeting these objectives requires FS-level evaluations. The results of the BERA, including the toxicity confounding factors evaluation, provide the initial framework to relate porewater chemistry and sediment chemistry. None of the sediment chemistry data was ignored. The focused porewater evaluation was the result of evaluating all sediment information in accordance with the Phase 2 RI Work Plan Volume 1. At USEPA’s request, the BERA screening process included an update to the Phase 1 SLERA using Phase 2 data applied to the established screening level hierarchy (see draft BERA report Figure 5-1). The outcome of this evaluation is a screening of all chemicals measured in bulk sediment and porewater and the identification of BERA COPECs using the most stringent screening criteria available. COPECs that were identified in bulk sediment were then evaluated using porewater data to assess actual bioavailability. There is no reason to further evaluate bulk sediment COPECs that were eliminated as risk drivers during the porewater screening process.	Partially acceptable. Although some aspects of the evaluation requested can be considered in the FS, the BERA should evaluate porewater and sediment data (1) Independently (i.e., compared to surface water thresholds or standards or criteria and compared to sediment thresholds or benchmarks, respectively); and (2) as potentially related exposure media. Contaminant concentrations in porewater may or may not be related to concentrations of contaminants in sediment, due to chemical-specific differences in bioavailability. Additional clarification is necessary based on EPA’s comment.
10.	USEPA	6/11/16	General Comments	--	--	10	As described in the specific comments, there are instances where data is presented without interpretation, and instances where data is over interpreted in a potentially biased manner. Equal weight should be given to all of the lines of evidence to provide a balanced evaluation. In addition, risks should be identified as acceptable (HQ≤1) or unacceptable (HQ>1). Revise the text and state HQs throughout the report.	Objection/ Clarification	The NCG disagrees that the data are interpreted in a biased manner. The interpretations presented in the report are based on an extensive review of the data. The report will be reviewed and revisedonse to specific comments. HQs will be presented for the baseline risk assessments (not the screening level assessments), and the text will be revised to indicate whether HQs are <1 or >1, and will be interpreted based on a weight-of-evidence approach. See also the response to ID No. 165.	Acceptable
11.	USEPA	6/11/16	General Comments	--	--	11	The statements regarding the static conditions and the lack of feeding the standard 10-day Leptocheirus protocol should be removed from all sections except the uncertainty section.	Disagree	The NCG does not agree that statements regarding the static conditions and the lack of feeding in the standard 10-day *Leptocheirus* protocol should be removed from all sections except the uncertainty section. The notable variability of the 10-day test is important (Kennedy et al. 2009). In an ecological risk assessment, a 10-day test measuring acute effect is not as strong of a line of evidence as a 28-day test measuring chronic endpoints that include growth and reproduction.	Unacceptable. Acute and chronic toxicity tests each has merit and there is no reason to assume that a 10-day test with mortality endpoints is or is not a “strong” line of evidence compared to a chronic 28-day test.

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12.	USEPA	6/11/16	General Comments	--	--	12	Each of the four reference areas represent four uniquely different categories based on presence or absence of industrial and CSO discharges. Study Area results should be compared to each of the individual reference area results. Study Area results should not be compared to reference areas as a whole. Much of the discussion should be moved to the Uncertainty section of the document. Additionally, statistical comparisons between the Study Area and reference areas should use comparable results from both the Study Area and reference areas. Non-comparable data should not be used for comparison. See specific comments.	Disagree	See the response to ID No. 3. The NCG also disagrees that much of the discussion should be moved to the uncertainty section. The risk questions included in Table 2-2 of the Phase 2 RI Work Plan Volume 1 explicitly include a comparison with reference areas. The BERA provides the analyses to answer the risk questions, and these analyses belong in the main body of the BERA.	Unacceptable. See EPA response to ID No. 3
13.	USEPA	6/11/16	General Comments	--	--	13	Summary tables should be provided in the report. Results are discussed in the text and often the report direct readers/reviewers to figures and attachments for results. Summary tables should be presented. See specific comments. Additionally, this report frequently presents the results of data evaluations by referring readers/reviewers to figures, tables, or attachments, with no discussion of results in the text. Results should be discussed and summarized in the text.	Agree	Summary tables and additional text will be provided where appropriate.	Acceptable
14.	USEPA	6/11/16	General Comments	--	--	14	Corrected Phase 1 TOC values, National Grid sediment data for the 0 to 4 and 4 to 8-inch sediment depth intervals, and sediment concentrations of total PCB congeners including the converted concentrations of Phase 1 Aroclors to congeners per EPA's directions should be used in the revised draft BERA report. The RI report and the BERA report should use the same sediment dataset.	Comply	National Grid sediment data for the 0- to 4-inch and 4- to 8-inch sediment depth intervals, and sediment concentrations of total PCB congeners including the converted concentrations of Phase 1 Aroclors to congeners per USEPA's directions will be incorporated in the revised SLERA and BERA analyses. Corrected Phase 1 TOC values will also be used in the screening of sediment data in the SLERA. See also the response to ID No. 111.	Acceptable
15.	USEPA	6/11/16	General Comments	--	--	15	Results of individual PAH and total PAH should be presented and discussed in the text, tables, and figures, and not presented as groups such as alkPAH, LPAH, and HPAH. Additionally, PAHs (17) or PAHs (16) were used in the SLERA. However, in this report, PAHs (34) were used in development of toxic units. An explanation that discusses the uncertainty associated with using only 17 PAHs in the SLERA should be provided.	Clarification	One reason the SLERA used PAH (17) is due to the fact that the sediment quality guidelines applied in the SLERA are relatively old (circa 1995) and based on the PAH (16/17) compared to the PAH (34) framework established in the USEPA Equilibrium Partitioning Sediment Benchmarks for PAHs (USEPA 2003) guidance. Individual PAH results were included in the draft BERA report bulk sediment screening and porewater summary tables. Broadening the discussion to include individual PAHs would do little to inform the BERA risk characterization because PAHs exist in mixtures in the environment and have a common mode of toxic action. USEPA guidance recognizes this fact in their report *Evaluating Ecological Risk to Invertebrate Receptors from PAHs in Sediments at Hazardous Waste Sites* (Burgess 2009) and in the Ecological Soil Screening Levels for PAHs (USEPA 2007), which are based on LPAH and HPAH sums.	Partially acceptable. While evaluating LMW PAH and HMW PAH has merit, the differences in toxicity of individual PAHs warrants evaluations of individual PAHs. Both approaches should be included in the BERA.
16.	USEPA	6/11/16	General Comments	--	--	16	For COPECs in sediment, this report only focuses on the SEM metals and total PAHs, and not individual identified	Disagree	The NCG applied a framework that uses bulk sediment screening values to screen contaminated sediment for	Unacceptable. See EPA response to ID No. 9.

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							COPECs, especially metals other than the six SEM metals. All identified COPECs, especially metals, in sediment should be evaluated and discussed, especially, in toxicity tests with toxic units above one.		potential toxic effects followed by more rigorous assessments of porewater. This is consistent with USEPA (2003 and 2005b) guidance and the best available science, which advocates for the initial use of sediment quality guidelines followed by refined exposure assessment through direct measurement of bioavailability (Burgess et al. 2013). All identified COPECs were evaluated. The BERA screening process applied the screening level hierarchy (see draft BERA report Figure 5-1) to all chemicals measured in bulk sediment and porewater. COPECs that were identified in bulk sediment were then evaluated using porewater data to assess actual bioavailability. Directly measured porewater concentrations are definitive exposure estimates. There is no reason to further evaluate bulk sediment COPECs that were eliminated as risk drivers during the porewater screening process.	
17.	USEPA	6/11/16	Executive Summary	--	--	1a	The Executive Summary should be revised to reflect changes in the document. Specific items are addressed below, but additional editing will be necessary. a. Delete boxes in this section. This is a technical document and not a public relations document.	Disagree	As for the BHHRA, text boxes are used in the Executive Summary to facilitate communicating key pieces of information and/or findings of the BERA.	Partially acceptable. Current text boxes are biased and misleading. If text boxes are to remain, they must all be unbiased statements of fact (i.e., complete statements not just the first part).
18.	USEPA	6/11/16	Executive Summary	--	ES-1	1b	b. Page ES-1, Second Paragraph, Last Sentence and Second Box: This sentence states "There are 22 CSOs along the creek that periodically release untreated industrial run-off and domestic sewage during rainfall events". The Box states "During rainfall events, Newtown Creek and its tributaries receive urban runoff and discharges from CSOs when the capacity of the local wastewater treatment plants are exceeded." Delete the box and add discussion on other discharges such as industrial, stormwater, permitted discharges to this paragraph.	Disagree/ Agree	The box will be retained, and the text will be revised to add a discussion on other discharges.	Partially acceptable. See EPA response to ID No. 17.
19.	USEPA	6/11/16	ES.1	Description of Study Area	ES-2	1c	c. Page ES-2, ES.1 Description of Study Area, First Complete Paragraph, First Sentence: It states "…..66% of this has no vegetation, with 33% supporting sparse non-native vegetation…..". However, on page 60 of Data Summary Report Submittal No. 1 states "….39,920 feet (67%) was identified as vegetated and 19,660 feet (33%) was identified as non-vegetated". Make necessary revision for consistency.	Agree	The text will be revised.	Acceptable. The paragraph shall also revise the language regarding "best use" to a direct quote from the NYSDEC guidance document: "The best usage of Class SD waters is fishing. These waters shall be suitable for fish, shellfish and wildlife survival. In addition, the water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. This classification may be given to those waters that, because of natural or man-made conditions, cannot meet the requirements for fish propagation (NYSDEC Chapter X, Division of Water, Part 701.14)."
20.	USEPA	6/11/16	ES.6	Fish Risk Assessment	ES-7	1d-i	d. Page E-7, ES.6 Fish Risk Assessment: i. First Complete Paragraph:	Agree	The text will be revised, as appropriate.	Partially acceptable, pending the text revision

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							• Specify the type of mummichog TRV for copper cited in this paragraph, i.e., whether it is it a dietary TRV or porewater TRV based on direct contact/ingestion. • State whether tissue contaminant concentrations and residue-based TRVs are based on whole body or other types of values (e.g., fillet or organ-specific).			
21.	USEPA	6/11/16	ES.6	Fish Risk Assessment	ES-7	1d-ii	ii. Second Complete Paragraph: • This paragraph includes too much interpretation at this stage..."only 6 locations and HQ of only 3" reflect opinions that should not be included here (italics added). • PCB concentrations should be summarized as "not exceeding surface water thresholds" rather than "not a concern for fish". • Last sentence: It states “Therefore, based on multiple lines of evidence, copper, PCBs, and PAHs are unlikely to pose a significant risk to fish in the Study Area as a result of porewater concentrations.” This statement is unclear and needs revision. The BERA uses a multiple lines of evidence approach, then states that one line of evidence is unlikely to pose risk because other lines of evidence do not appear to pose risk. Evaluation of fish exposure to porewater supports a conclusion of unacceptable risk to fish based on exposure to porewater regardless of the results of other lines of evidence. Additionally the term “a significant risk” should be revised to “acceptable risk” if it indeed is supported by the data.	Agree/ Disagree	The text will be revised to reduce the amount of interpretation. However, a discussion on the multiple lines of evidence will be retained.	Partially acceptable. The RTC states “a discussion on the multiple lines of evidence will be retained”. Note that EPA comment requires “Clarification”. Additional clarification is needed for the discussion on multiple lines of evidence.
22.	USEPA	6/11/16	ES.7	Wildlife Risk Assessment	ES-8	1e-i	e. Page ES-8, ES.7 Wildlife Risk Assessment, First Complete Paragraph: i. Revise this paragraph to clarify that risks are based on feeding guilds (see page 13 Section 3.1.2 Receptors). Risks are not evaluated just for these particular receptors.	Agree	The text will be revised.	Acceptable
23.	USEPA	6/11/16	ES.7	Wildlife Risk Assessment	ES-8	1e-ii	ii. This is a biased presentation of results. As written, it appears that PCBs and lead are unimportant, and HQs of about 2 mean	Objection/ Clarification	The discussion provided is not biased but reflects scientific opinion based on interpretation of the available data. However, the text will be revised to present HQs as greater	Partially acceptable. All HQs>1 should be identified as “unacceptable”. HQs = 1 and HQ <1 should be considered “acceptable”.

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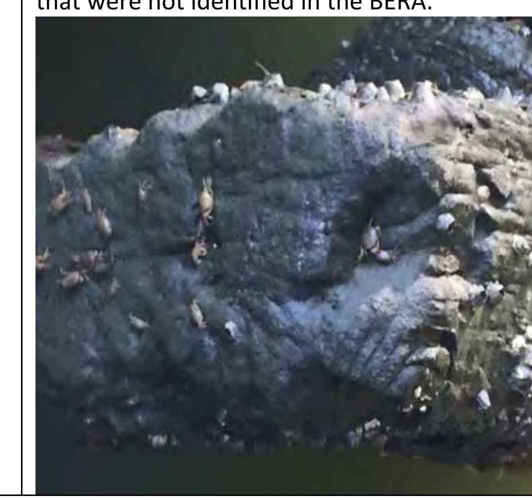
							little. Delete the opinions and biased conclusions and present the results. All HQs exceeding one deserve full disclosure and evaluations, because higher HQs do not necessarily suggest more severe effects, and lower HQs do not necessarily preclude potential for serious or severe effects.		than or less than 1.0, and will be interpreted based on a weight-of-evidence approach.	Unacceptable portion of comment is retention of biased tone of presentation, while revisions to text are acceptable pending final review.
24.	USEPA	6/11/16	ES.8	Qualitative Evaluations	ES-8 and ES-9	1f-i	f. Pages ES-8 and ES-9, ES.8 Qualitative Evaluations, Second Paragraph: i. Page ES-8: Include scientific names for species listed upon first appearance.	Agree	The text will be revised.	Acceptable
25.	USEPA	6/11/16	ES.8	Qualitative Evaluations	ES-9	1f-ii	ii. Page ES-9, First Incomplete Sentence: It states that Gerritsen Creek had highest species richness and highest average salinity (~28 ppt); while the Study Area had the lowest species richness and lowest average salinity (~21 ppt). The differences of 21 and 28 ppt salinity may not account for large differences in taxa richness. The statement is opinion with no supporting data and should be deleted.	Disagree	The statement is supported by the analyses conducted in Section 10 of the BERA.	Partially acceptable. Acceptance of this response pending inclusion of additional supporting information.
26.	USEPA	6/11/16	ES.9	BERA Conclusions	ES-10	g-i	g. Page ES-10, ES.9 BERA Conclusions: i. Third Bullet: It states "There are low risks to resident fish from dietary copper and low risks to birds from dietary PCBs and lead." It is unclear what "low risks" due to exposure to these COPECs means. Risks should be identified as acceptable (HQ≤1) or unacceptable (HQ>1). Revise the text and list HQs. Additionally, note that on page ES-6, it states "no risks are identified for fish…" (first paragraph, first sentence). However, in this bullet it states "There are low risks to resident fish…". Make necessary changes for consistency, not only in Executive Summary, but also in the Fish Risk Characterization Section.	Clarification	The text will be revised to clarify what is meant by "low risk" based on a weight-of-evidence approach. The text on page ES-6 for fish is referring to the tissue residue approach, while the third bullet on page ES-10 for fish is referring to the fish dietary approach.	Partially acceptable. HQs>1 need to be identified as "unacceptable".
27.	USEPA	6/11/16	ES.9	BERA Conclusions	ES-10	g-ii	ii. Fifth Bullet: It states "For benthic macroinvertebrates, DO concentrations below 3 mg/L contribute non-CERCLA related stress….." Clarify the following: • Clarify whether the low DO threshold of 3 mg/L is based on a single point measurement, or some statistic such as daily or weekly average. • Specify the duration and frequency of low DO sufficient to adversely affect aquatic life.	Clarification	The DO threshold of 3 mg/L is referring to the surface water standards included in the NYCDEP SD waterbody classification for Newtown Creek. The text will be clarified to reflect this. A discussion on the effects of low DO to the benthic community is provided in Section 8.3.2 of the BERA; it is not appropriate to provide such details in an executive summary.	Partially acceptable. It is still necessary to state clearly in the BERA if the low DO is based on site-specific averages or on a measured minimum.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							More information is necessary because a single short term exposure to very low DO can kill organisms (especially those with limited mobility) regardless of longer term average exposures.			
28.	USEPA	6/11/16	1.1	Background	2	2	Page 2, Section 1.1 Background, Second and Third Paragraph: Need to revise paragraphs to accurately reflect the role of background in the risk assessment. Use the following language in these paragraphs "A baseline risk assessment generally is conducted to characterize the current and potential threats to human health and the environment that may be posed by hazardous substances, pollutants, and contaminants at a site. EPA's 1997 Risk Assessment Guidance for Superfund (RAGS) provides general guidance for selecting COPCs, and considering background concentrations. In RAGS, EPA cautioned that eliminating COPCs based on background (either because concentrations are below background levels or attributable to background sources) could result in the loss of important risk information for those potentially exposed, even though cleanup may or may not eliminate a source of risks caused by background levels. In light of more recent guidance for risk-based screening (USEPA 1996; USEPA 2000) and risk characterization (USEPA 1995c), this policy recommends a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization. Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished. When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization. (USEPA 2002. Role of Background in the CERCLA Cleanup Program, April 26, 2002, OSWER 9285.6-07P)."	Clarification	Relevant USEPA guidance on the role of background in the risk assessment will be reviewed; the text will be revised if necessary.	Acceptable, pending details of revision.
29.	USEPA	6/11/16	1.2	Objective	3	3	Page 3, Section 1.2 Objective, First Paragraph: The objective of the BERA is to "1) identify and characterize the current and potential threats to the environment from a hazardous substance release, 2) evaluate the ecological impacts of alternative remediation strategies, and 3) establish cleanup levels in the selected remedy that will protect those natural resources at risk." (USEPA 1994e, OSWER Directive 9285.7-17). Replace the end of the paragraph with the language above.	Disagree	Objectives 2 and 3 are informed by the risk assessment but are FS-level evaluations. Therefore, the NCG does not agree that the end of the paragraph should be replaced with the suggested language.	Unacceptable. EPA stands by the original comment.
30.	USEPA	6/11/16	2.1.2	History and	6	4a	Pages 6 and 7, Section 2.1.2 History and Current Status:	Agree	The text will be revised.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
				Current Status			a. Page 6, Last Line: Circulation is described as being typically controlled by semi-diurnal tides. Given that this is a tidally-influenced waterbody, it is just controlled by the tides. Delete "typically controlled".			
31.	USEPA	6/11/16	2.1.2	History and Current Status	7	4b	b. Page 7, First Complete Paragraph, Third Sentence: Revise to read "The classification indicated the best usage of Class SD waters is fishing."	Agree	The text will be revised.	Acceptable. The paragraph shall revise the language regarding "best use" to a direct quote from the NYSDEC guidance document: "The best usage of Class SD waters is fishing. These waters shall be suitable for fish, shellfish and wildlife survival. In addition, the water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. This classification may be given to those waters that, because of natural or man-made conditions, cannot meet the requirements for fish propagation (NYSDEC Chapter X, Division of Water, Part 701.14)."
32.	USEPA	6/11/16	2.1.3	Available Habitat	7	5a-i	Pages 7 and 8, Section 2.1.3 Available Habitat: a. Page 7: i. First Paragraph, First Sentence: It states "…..66% of this area has no vegetation, with 33% supporting sparse non-native vegetation…..". However, page 60 of the Data Summary Report Submittal No. 1 states "….39,920 feet (67%) was identified as vegetated and 19,660 feet (33%) was identified as non-vegetated". Make necessary revision for consistency.	Agree	The text will be revised ("66% developed with sparse non-native vegetation, 33% developed with no vegetation").	Acceptable
33.	USEPA	6/11/16	2.1.3	Available Habitat	7	5a-ii	ii. Last Paragraph, Last Sentence: The sentence indicates that access to intertidal areas is limited, however, this is the ecological risk assessment and invertebrates, fish, birds and mammals are not limited in access to intertidal areas because of anthropogenic features. Revise the sentence.	Agree/ Clarification	The text will be revised, although access for the raccoon is likely limited.	Acceptable
34.	USEPA	6/11/16	2.1.3	Available Habitat	8	5b-i	b. Page 8: i. First Paragraph, Eighth Sentence: It states "However, even within these areas, there are several factors such as high turbidity and porewater sulfide that can limit the degree to which submerged macrophytes can establish". Provide references for the studies that show high turbidity and porewater sulfide limit submerged macrophytes.	Agree	References will be provided.	Acceptable
35.	USEPA	6/11/16	2.1.3	Available Habitat	8	5b-ii	ii. First Paragraph, Last Sentence: This sentence discusses porewater sulfide concentrations; however, it does not identify porewater sulfide concentrations in relation to areas that have sufficient light (i.e., >3.3 feet	Agree	Porewater sulfide by surface water depth will be evaluated.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							Secchi disk measurement). Porewater sulfide concentrations by depth should be provided to better reflect if porewater sulfide is associated with plant growth.			
36.	USEPA	6/11/16	2.1.4	Ecological Community	9	6a	Page 9, Section 2.1.4 Ecological Community: a. First Incomplete Paragraph: This paragraph describes results of Phase 1 sampling (no benthic invertebrates found) but fails to include results of Phase 2 sampling. The reporting is biased when all data are not described. Revise this paragraph.	Objection/ Clarification	The reporting is not biased since the paragraph, which starts on page 8, includes a discussion of Phase 1 and Phase 2 benthic community data.	Acceptable, if the revised BERA report includes discussion on both Phase I and Phase 2 sampling.
37.	USEPA	6/11/16	2.1.4	Ecological Community	9	6b-i	b. First Complete Paragraph: i. Confirm whether the order presented for the fish species correspond to actual abundance values measured.	Clarification	The dominant fish species were not listed in any particular order, but the text will be revised to list them in order of actual abundance (i.e., mummichog, Atlantic menhaden, and striped bass).	Acceptable
38.	USEPA	6/11/16	2.1.4	Ecological Community	9	6b-ii	ii. There are populations of mud, green, Asian and fiddler crabs (and potentially others) present in the intertidal zone that were not included in the benthic community surveys and likely overlooked during the wildlife surveys. Additional text should be added to explain this.	Disagree	The benthic community surveys were not designed to count epibenthic invertebrates. The fish and crab surveys did target crabs but only found blue crab and horseshoe crab in the Study Area. Other species that were found in the reference areas but not in the Study Area are calico crab, green crab, spider crab, and stone crab (see Table 10-11).	Unacceptable. The purpose of this comment is not being addressed. The area of the creek that is between the upland area and intertidal area has a number of organisms that are important in the food web of both aquatic and terrestrial organisms. These organisms include several species of crabs (mud, Asian, green, fiddler) that were not specifically included in either the wildlife surveys as they were focused on larger fauna such as birds and mammals, nor in the benthic community surveys, as these organisms do not spend time submerged. Thus, neither survey identified the potential species present. As seen in the photo below, there are a variety of species present that were not identified in the BERA. 

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
39.	USEPA	6/11/16	2.1.4	Ecological Community	9	6c-i	c. Second Complete Paragraph: i. Descriptors, such as frequent and infrequent, are used in this paragraph. Quantitative terms, for example 5 out of 7 or 1 out of 100, should be used instead of subjective descriptions.	Clarification	Although the wildlife surveys were intended to be qualitative only, quantitative terms will be used if appropriate.	Acceptable
40.	USEPA	6/11/16	2.1.4	Ecological Community	9	6c-ii	ii. Change the scientific name for feral cats from "Felis sylvestries" to "Felis catus".	Agree	The text will be revised.	Acceptable
41.	USEPA	6/11/16	2.2	Reference Areas	9	7a	Pages 9 and 10, Section 2.2 Reference Areas: a. Page 9, First Paragraph: Replace the first sentence with the following text "The CERCLA process uses background and reference information (USEPA 2002) to evaluate impacts to receptors from exposure to CERCLA hazardous substances and to determine naturally occurring and anthropogenic background levels of CERCLA hazardous substances."	Agree	The text will be revised.	Acceptable
42.	USEPA	6/11/16	2.2	Reference Areas	10	7b	b. Page 10, First Paragraph, Last Sentence: As described in this paragraph, four types of reference areas were selected. The evaluation of reference areas should include comparison of Newtown Creek with each individual type of reference area.	Disagree	See the response to ID Nos. 3 and 12.	Partially acceptable. See EPA's response to ID Nos. 3 and 12.
43.	USEPA	6/11/16	3	Problem Formulation	12	8	Page 12, Section 3 Problem Formulation, First Paragraph: Include additional text that indicates the SLERA addressed Steps 1 and 2 of the EPA ecological risk assessment paradigm.	Agree	The text will be revised.	Acceptable
44.	USEPA	6/11/16	3.1.1	Sources	12	9	Page 12, Section 3.1.1 Sources: Revise this paragraph to reflect contributions from high to low and to identify the release from industrial use, spills and discharges as the primary sources. Additionally, provide references or data that indicate, quantitatively, that "regional" contamination is a primary source (i.e., greater than the past industrial discharges or CSO inputs) to Newtown Creek. The text suggests "regional background" is a significant source; however, no data is presented to support this, and no mention is made of contaminants with initial sources in the creek being transported to other areas.	Agree	The text will be revised and data/references will be provided on regional background sources.	Acceptable
45.	USEPA	6/11/16	3.1.2	Receptors	13	10	Page 13, Section 3.1.2 Receptors, Third Bullet: White perch should also be included.	Disagree	As noted in the footnote on page 13, the risks to fish based on tissue residues, and risks to wildlife through the consumption of fish, are fulfilled by using other fish species collected during the Phase 2 fish and crab surveys.	Unacceptable. Risks to fish should be evaluated using all available data, including white perch data.
46.	USEPA	6/11/16	3.1.3	Exposure Pathways	13 and 14	11	Pages 13 and 14, Section 3.1.3 Exposure Pathways: The first sentence in this subsection states "The exposure pathways evaluated in this risk assessment are listed by receptor group in the following:" Nine pathways are listed, but two pathways on Table 3-1 are omitted:	Agree	Text will be revised to indicate that aquatic macrophyte, amphibian, and reptile exposure pathways were evaluated qualitatively.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							exposure to aquatic macrophytes and exposure to amphibians and reptiles. Although these two pathways are listed as "qualitative evaluation", they should be included.			
47.	USEPA	6/11/16	4	Data Evaluation	16	12a	Pages 16 and 17, Section 4 Data Evaluation: a. Page 16, Second Paragraph, Last Sentence: Clarify what "but not subject to the same data usability criteria or data treatment methods" is describing.	Clarification	This is describing the biological surveys (fish and crab, wildlife, and habitat) in contrast to the analytical chemistry data.	Partially acceptable. Pending addition of clarifying text.
48.	USEPA	6/11/16	4	Data Evaluation	16 and 17	12b	b. Pages 16 and 17: Porewater was collected and was evaluated in this BERA. However, porewater was omitted in most of the discussion in this section, such as in the first paragraph on page 16 where it reads "for various media (surface sediment, surface water, and tissue)". Add "porewater" to appropriate subsections.	Agree/ Clarification	This particular sentence was referring to field-collected samples, rather than laboratory-based sample collection. The text will be revised as appropriate.	Acceptable
49.	USEPA	6/11/16	4.1	Data Usability	16	13a	Pages 16 and 17, Section 4.1 Data Usability: a. Page 16, First Paragraph, Third Sentence: It states "…to determine whether it was reasonable to include the data for use in the BERA." The objective of the data usability is to determine whether data meet DQOs including precision, accuracy, completeness, comparability, and representativeness. Thus, the objective of a data usability assessment is to determine whether data are usable for the intended purpose as described in the work plan and QAPP such as extent of contamination, risk assessments, modeling, and FS. To determine "whether the data is reasonable", is not one of DQOs. Revise the sentence.	Agree	The text will be revised.	Acceptable
50.	USEPA	6/11/16	4.1	Data Usability	17	13b	b. Page 17, First Sentence: This sentence concludes that all datasets were determined to be usable for the BERA….." Provide details to justify and support this conclusion, specifically, accuracy, the completeness of each dataset, comparability, and representativeness.	Clarification	A comprehensive data usability assessment is being completed and will be included in the revised Data Usability Assessment, Section 2, of the draft Phase 2 Data Summary Report, which will be included as an appendix to the draft RI Report.	Acceptable
51.	USEPA	6/11/16	4.2	BERA Dataset	17	14a	Page 17, Section 4.2 BERA Dataset, First Paragraph: a. Second Sentence: Add "porewater".	Agree	The text will be revised.	Acceptable
52.	USEPA	6/11/16	4.2	BERA Dataset	17	14b	b. Third Sentence: Add "consumption of plants (e.g., phytoplankton)".	Agree/ Clarification	If this comment is referring to the second sentence, the text will be revised.	Acceptable
53.	USEPA	6/11/16	4.2.2	Non-RI/FS Program Data	18 and 19	15	Pages 18 and 19, Section 4.2.2 Non-RI/FS Program Data: This section describes sediment data collection for National Grid, but does not provide any context for how the National Grid data are related to the BERA, such as whether this National Grid sediment dataset was included in the BERA evaluation and, if so, what specific data from this dataset were included in the BERA evaluation.	Agree	A brief description of the National Grid sediment program will be added.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							Describing collection of National Grid data is meaningless without discussing the details of its use in the BERA. Provide details of how the National Grid dataset is used in the BERA.			
54.	USEPA	6/11/16	4.2.3	Surface Water Data	19	16	Page 19, Section 4.2.3 Surface Water Data, Second Paragraph: It states "…surface water dataset comprised 364 samples collected from 24 stations (see Table 4-2)". However, Table 4-2 lists 192 "Location Count". A footnote to the table is necessary to explain the differences between "location count" in the table and "station" in the text.	Agree	A footnote will be added to Table 4-2.	Acceptable
55.	USEPA	6/11/16	4.2.4	Surface Sediment Data	21	17	Page 21, Section 4.2.4 Surface Sediment Data, First Complete Paragraph: It appears that two different types of grab samples were included (i.e., ½ grab and entire grab) for evaluating benthic community. Add additional text to identify if using different volumes of sediment may have impacted the benthic metrics. For example, if more sediment was used, would the total count be comparable to a sample that used less sediment volume.	Clarification	Counts are area-based, not volume-based. In addition, the area sampled and volumes of sediment collected during Phase 1 and Phase 2 were similar. Most sediment samples were collected with a 0.052-m^2 Ekman grab during Phase 1. The area of one-half of the pneumatic van Veen power grab used during Phase 2 was 0.056 m^2.	Partially acceptable. Pending addition of clarifying text.
56.	USEPA	6/11/16	4.2.4.1	Surface Sediment Chemistry	22	18	Page 22, Section 4.2.4.1 Surface Sediment Chemistry, First Complete Paragraph: The depth of sediment samples in the National Grid GEC field program included in this BERA evaluation should be listed. As shown in Attachment A03 only 0-0.33 feet (0-4 inches) of sediment samples were included in the BERA. Per EPA's direction in the April 5, 2015 sediment comment/response matrix on the use of National Grid data in the RI Report, the length-weighted-average method be used to calculate 0 to 6-inch concentrations for the 22 locations where co-located 0 to 4-inch and 4 to 8-inch samples are available. For the remaining 8 locations that do not have co-located 0 to 4-inch and 4 to 8-inch samples, the 0 to 4-inch data should be used. The revised draft BERA report should use the same surface sediment dataset that is used in the RI report.	Agree	The revised draft BERA report will include the length-weighted-average method to calculate 0- to 6-inch concentrations for the 22 locations where co-located 0- to 4-inch and 4- to 8-inch samples are available.	Acceptable
57.	USEPA	6/11/16	4.2.4.3	Sediment Toxicity and Bioaccumulation Testing	24	19	Page 24, Section 4.2.4.3 Sediment Toxicity and Bioaccumulation Testing, Sixth Bullet: Add "(Alpha Analytical)" to the end of the bullet to be consistent with other bullets and Table 4-6.	Clarification	Alpha Analytical is included in the parentheses at the end of the sixth bullet.	Acceptable
58.	USEPA	6/11/16	4.2.4.3.2	Porewater	25	20a	Pages 25 and 26, Section 4.2.4.3.2 Porewater: a. Page 25, First Sentence: Revise this sentence to "As described in Section 8, in addition to using bulk sediment to evaluate toxicity, sediment porewater was also used in conjunction with sediment toxicity test data to provide another measure of contaminants contributing to benthic macroinvertebrate risk." And add "This method may provide a more definitive identification of benthic impacts." A reference(s) that supports this statement will need to be included if the NCG wishes to use this rationale.	Agree/ Clarification	Suggested text will be considered and references to support the use of a porewater approach will be added. Examples include USEPA (2003, 2005b, 2012) and Burgess (2009). Sulfide is a well-recognized confounding factor that is addressed explicitly in many sediment management testing programs. Caldwell (2005) is a gray literature presentation made at the Sediment Management Annual Review Meeting (SMARM), which is a joint meeting of the U.S. Army Corps of Engineers Dredged Material Management Program (DMMP) and the Washington State Department of Ecology's Sediment Management Standards (SMS) Program, and is a	Acceptable. Concerns about sulfide should be presented in the uncertainty section.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							The sulfide "threshold" (pages 25 and 81) is derived from an unpublished presentation made at a private industry association meeting (Sediment Management Workgroup). Although the basis for the "threshold" is not well documented, results from the toxicity tests shows that this "threshold" provides no explanatory power. This section states, "In the 10-day and 28-day tests, porewater sulfide levels exceeded 20 mg/L in two samples (EB006SG and MC017SG) and six samples (EB006SG, EB036SG, MC005SG, NC071SG, WE010SG, and WE011SG), respectively. All 28-day test samples with sulfide above 20 mg/L have reduced survival, growth, and reproduction" (page 81). Sample EB006SG had a probability of toxicity (p_{max}) (Field & Norton, 2014)=0.95 and ERMq=2.5; sample MC017SG had p_{max}=0.97 and ERMq=1.9 (max=10). The 28-d samples from NC (EB006SG, EB036SG, MC005SG, NC071SG) had 10-d survival ranging from 0- 7% and 28-d survival from 0-26% and a p_{max}24 ≥0.95, while the Westchester Creek sample had 10-d survival of 87-91% and 28-d survival of 81-90%, 28-d biomass of 97%, and p_{max} ≤0.4. We conclude from these results that the samples with "elevated" porewater sulfide levels with very high levels of other contaminants were highly toxic, while those Westchester Creek samples with "elevated" porewater sulfide levels had much lower levels of other contaminants and had little to no toxicity in 10-d or 28-d survival or 28-d biomass endpoints.		helpful review done in support of an inter-agency testing program for sediment management. Other gray-literature sources are available and will be provided (e.g., Gardiner et al. 2007). Additional discussion will be provided to clarify thresholds for sulfide toxicity and interpretation of sulfide porewater measured in the *Leptochieirus* tests.	
59.	USEPA	6/11/16	4.2.4.3.2	Porewater	26	20b	b. Page 26, Last Sentence: It states "The porewater data are presented in Attachment A8." The porewater data should be summarized in a table and presented.	Agree	A table will be included that summarizes the porewater data.	Acceptable
60.	USEPA	6/11/16	4.2.4.3.4	Bioaccumulation Testing	27	21	Page 27, Section 4.2.4.3.4 Bioaccumulation Testing, Second Paragraph: Add additional text that describes why bioaccumulation testing was not conducted in the reference areas.	Agree	Bioaccumulation tests were conducted for the Study Area using sediment samples with a range of bioaccumulative COPEC concentrations. It was anticipated that the results could be used to predict tissue chemical concentrations from sediment chemical concentrations in the reference areas if necessary. However, because risk estimates using polychaete tissue data were not conducted for the reference areas, predicted tissue concentrations were not needed.	Acceptable
61.	USEPA	6/11/16	4.2.5.1	Fish and Crab	27 and 28	22a	Pages 27 and 28, Section 4.2.5.1 Fish and Crab: a. Information on individual fish included in each composite should be provided (e.g., length,	Disagree/ Clarification	For purposes of selecting fish for composite samples, the only "evaluation" that was conducted was to ensure that the composite sample provided enough tissue mass to	Partially acceptable, provide additional text to clarify the criteria for determining the acceptability of composite samples.

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							weight, gender). Data should also be evaluated and interpreted.		complete the chemical analyses and that the smallest fish in the composite was longer than 75% of the length of the largest fish (see Phase 2 RI Work Plan Volume 1). In all but one or two instances, this 75% rule was met. The USEPA-approved Phase 2 RI Work Plan Volume 1 did not contemplate any additional "evaluation" or "interpretation" of individual fish.	
62.	USEPA	6/11/16	4.2.5.1	Fish and Crab	28	22b	b. Page 28, First Paragraph: Include the formula used to reconstitute whole body residues.	Clarification	The equations for calculating whole-body tissue concentrations are provided in Section 4.3.4.4 on pages 36 and 37.	Acceptable. Add text to guide reader to these equations.
63.	USEPA	6/11/16	4.2.5.2	Bivalves	29	23	Page 29, Section 4.2.5.2 Bivalves, First Paragraph, Last Sentence: It states "Bivalves were not deployed in the reference areas". Add a statement to the text to support not deploying bivales in reference locations.	Agree	A caged bivalve study in the Study Area was requested by USEPA during development of the Phase 2 RI Work Plan Volume 1. In recognition of the "at risk" nature of such an undertaking (e.g., vandalism, ship and boat traffic disruption), the study was confined to the Study Area. The study design was described in an addendum to the Phase 2 RI Work Plan Volume 1.	Acceptable, pending additional clarifying text.
64.	USEPA	6/11/16	4.3.1	Field Duplicates	32	24	Page 32, Section 4.3.1 Field Duplicates: Although field duplicates were not used for the risk estimates, additional text should be included to describe if the duplicates were similar to the samples that were used, and if not, then a discussion regarding over- or under-estimation of risk should be included in the uncertainty section.	Agree	Additional information on field duplicates will be added to Section 4.3.1. Field duplicate RPDs were calculated in each data validation report. Overall, Phase 2 field precision was assessed in the data usability assessment, Section 2, of the draft Phase 2 Data Summary Report, which will be included as an appendix to the draft RI Report. In summary, field duplicates indicate generally good field precision.	Acceptable
65.	USEPA	6/11/16	4.3.2, 4.3.2.1, 4.3.2.2, 4.3.2.3 and 4.3.3	Method Selection Protocol	33	25	Page 33, Sections 4.3.2 Method Selection Protocol: For each subsection in this section (4.3.2, 4.3.2.1, 4.3.2.2, 4.3.2.3 and 4.3.3), additional text should be included to discuss the impact on exposure point concentrations and risk estimates that may occur from following the methods identified. The discussion should include whether risks estimates would be over- or under- estimated or not impacted.	Agree	Text will be added in the uncertainty section to discuss potential impacts on risk estimates from following the methods presented in Section 4.3.2.	Acceptable
66.	USEPA	6/11/16	4.3.4.2	Kaplan-Meier Method	36	26	Page 36, Section 4.3.4.2 Kaplan-Meier Method, Second Bullet: This bullet discusses rejected values. Provide information on rejected data, such as how many and in what media since rejected data was not discussed in Section 4.1 Data Usability. Therefore, identification and discussion of rejected (unusable) data should be part of data usability assessment.	Clarification	A comprehensive data usability assessment is being completed and will be included as Section 2 of the draft Phase 2 Data Summary Report, which will be included as an appendix to the draft RI Report. Section 4.3.4.2 will be revised to reference this document.	Acceptable
67.	USEPA	6/11/16	5	Phase 2 Risk Screening	40	27	Page 40, Section 5 Phase 2 Risk Screening: As General Comment No. 2 noted, the screening process described in this section did not follow the process outlined in the BERA Problem Formulation (see page 6 Section 3 Identification of Preliminary COPECs). The COPECs identified in the SLERA TM2 were used as the definitive COPECs in the BERA risk analysis. In this BERA, the maximum concentrations of all detected chemicals in sediment and surface water from Phase 1 and Phase 2 investigations should be compared to screening levels to develop the definitive COPEC list. Subsequently, 95% UCLs of the COPECs should be used in the BERA risk	Disagree	See the response to ID No. 2.	Acceptable

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							analysis.			
68.	USEPA	6/11/16	5.1	Introduction	40	28	Page 40, Section 5.1 Introduction, First Paragraph: All compounds that were initially screened out using a frequency of detection of 5% should be included in the uncertainty section of the BERA. Inclusion should include a table listing all compounds screened out using this criterion, and a text discussion regarding potential hotspots associated with specific compounds even if those compounds were infrequently detected.	Disagree	Figure 5-1 depicts the surface water and sediment screening process. This figure also was included in the BERA PF as part of the USEPA-approved Phase 2 RI Work Plan Volume 1. Compounds that are screened out following this process do not need to be included in the uncertainty section.	Unacceptable. EPA stands by initial comment.
69.	USEPA	6/11/16	5.2	Data Used and Data Treatment	41	29	Page 41, Section 5.2 Data Used and Data Treatment, First Incomplete Paragraph, Last Sentence: It states "Exposure concentrations were represented either as the maximum value (based on detected or non-detected results or as the 95% UCL). Revise sentence to clearly state how to determine when the maximum detected concentration or 95% UCL is used as the EPC. All EPCs should be clearly identified as maximums or 95% UCLs.	Clarification	See the response to ID No. 2. The text will be revised to clarify.	Acceptable
70.	USEPA	6/11/16	5.3.2	Surface Sediment	41 and 42	30a	Pages 41 and 42, Section 5.3.2 Surface Sediment: a. Prior to re-screening, sediment data should be normalized with approved TOC values adjusted in accordance with EPA's direction in the March 1, 2016 background data presentation comment/response matrix for locations where archived cores were not available for reanalysis. Similarly, National Grid surface sediment (0 to 4-inch and 4 to 8-inch) data should be adjusted in accordance with EPA's direction in the April 5, 2015 sediment data presentation comment/response matrix (comment No. 3) and be re-screened.	Comply	See the response to ID No. 14.	Acceptable
71.	USEPA	6/11/16	5.3.2	Surface Sediment	42	30b	b. Page 42: NYSDEC sediment screening levels (1998, 1999, and 2004) used in the report are outdated. The most recent version (Screening and Assessment of Contaminated Sediment dated June 24, 2014) should be used.	Disagree	See the response to ID No. 7.	Acceptable
72.	USEPA	6/11/16	5.3.3	Aquatic Organism Tissue	42	31	Page 42, Section 5.3.3 Aquatic Organism Tissue: This section states "For screening purposes, the minimum of the geometric mean of the no observed adverse effect level (NOAELs) for survival, growth, or reproduction was selected". It is inappropriate to use geometric mean for screening.	Disagree	For the fish and wildlife screen, the NCG believes that the use of the geometric means of the NOAELs from EcoSSL is appropriate for the screening step in a CERCLA BERA and is consistent with the approach used by USEPA in EcoSSL to develop NOAEL-based TRVs for screening purposes. See also response to ID No. 6.	Partially acceptable. The NCG response states that the approach used was "consistent with the approach used by USEPA in EcoSSL". Please include all pertinent information regarding your development of NOAEL-based TRVs, to show that the EcoSSL TRV derivation method was followed, including selection of appropriate studies, the data evaluation process, exposure dose modeling, and TRV derivation (EPA's 2005 Guidance for Developing Ecological Soil Screening Levels). See EPA response to ID No. 6.
73.	USEPA	6/11/16	5.4	Screening Results	43	32	Page 43, Section 5.4 Screening Results: The primary goal of the screening process was to ensure that there were no additional COPCs identified from the Phase 2 data. Section 5.4 should be revised to reflect this purpose. Only	Clarification	See the response to ID No. 2. The text will be revised to clarify.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							contaminants that were not identified in Phase 1 need to be discussed in this section.			
74.	USEPA	6/11/16	5.4.2	Surface Sediment	45	33	Page 45, Section 5.4.2 Surface Sediment, First Bullet: Add “alpha and beta” to chlordane.	Agree	The text will be revised.	Acceptable
75.	USEPA	6/11/16	5.4.3	Aquatic Organism Tissue	46	34	Page 46, Section 5.4.3 Aquatic Organism Tissue: Detected chemicals in all biota tissues for which there are no screening levels must be retained and discussed in the Uncertainty section.	Agree/ Clarification	Chemicals on the USEPA list of bioaccumulative compounds that were detected in tissue, but for which there are no SLs, will be discussed in a separate uncertainty section.	Acceptable
76.	USEPA	6/11/16	6	Surface Water Risk Assessment	48	35a	Page 48, Section 6 Surface Water Risk Assessment: a. The title of this section should be revised to “Phytoplankton and Zooplankton Risk Assessment”. Subsequently, discussion in this section should be focused on these two receptors since the other three receptors (bivalves, benthic macroinvertebrates and fish) were discussed in separate subsections of this section.	Disagree	The intent of this section is to evaluate risks to aquatic life in general. As stated in the following from page 48: *This section addresses the following risk question:* • *Are the levels of contaminants in surface water from the Study Area greater than surface water toxicity-based values for the survival, growth, or reproduction of phytoplankton, zooplankton, bivalves, benthic macroinvertebrates, and fish?*	Partially acceptable, pending addition of text clarifying link to this specific risk question.
77.	USEPA	6/11/16	6	Surface Water Risk Assessment	48	35b	b. Page 48, Section 6 Surface Water Risk Assessment, Second Paragraph: Change “Section 5” to “Section 5.4.1” to be more specific.	Agree	The text will be revised.	Acceptable
78.	USEPA	6/11/16	6.1	Exposure Assessment	49	36	Page 49, Section 6.1 Exposure Assessment, First Paragraph: It states “…in general there are no areas with elevated concentrations that warrant examination on a small spatial scale (see Figures 6-1 through 6-5)”. This statement may be true for total DDx, and carbon disulfide. However, it is not true for copper. Figure 6-2 shows copper concentrations are higher at Whale Creek, RM0.9, RM2.2 and RM2.8 than other RM and tributaries. Revise this statement. Additionally, this paragraph discusses total cyanide and free cyanide concentrations and focuses only on free cyanide for the quantitative analysis. Both total and free cyanide concentrations should be presented in the risk characterization section, with additional discussion in the uncertainty section.	Clarification	The surface water dataset is a robust dataset with many measurements made over many months. As a result, the 95% UCL concentration, which is used to assess potential risks, is the most reliable value and any isolated maximum value does not warrant examination on a smaller spatial scale. For copper in surface water, there are scattered lower and higher values throughout the Study Area, which in general exceed the majority of the values by less than a factor of 2. One value, at CM 2.42 (90.2 µg/L), exceeds all other values by a factor of approximately 4 (next highest value is 25.1 µg/L). The text will be revised to make note of this one value. Because this is part of the baseline risk analyses, it is appropriate to focus on free cyanide. However, additional discussion will be included in the uncertainty discussion.	Acceptable
79.	USEPA	6/11/16	6.2	Measures of Effect	49 to 51	37	Pages 49 to 51, Section 6.2 Measures of Effect: Alternate screening values were used in COPEC selection for surface water and thus, eliminates several COPECs from risk assessment which should be evaluated. See comments below.	Clarification	Section 6 is part of the baseline risk assessments, not the risk screening. As such, the use of alternative threshold values is valid.	Partially acceptable, pending addition of clarifying text.
80.	USEPA	6/11/16	6.2.1	Cyanide	49	38a	Page 49, Section 6.2.1 Cyanide: a. This section discusses studies that evaluated toxicity of cyanide to a variety of crab species. The conclusion provided is that a higher TRV should be used because there were studies that showed toxicity at higher levels than those developed by EPA 1985a. However, there is no discussion regarding the sensitivity of the species used or the ranges of toxicity observed in the Gensemer study. Both values should be used as a	Disagree	The Gensemer study is a thorough evaluation of the toxicity data conducted on behalf of the Water Environment Research Federation. Given the confidence around the threshold values presented in the study, it is not necessary to bound the risk estimates.	Unacceptable. Toxicity data for crabs are limited, and the majority of taxa are untested for contaminant sensitivity. Bounding estimates are appropriate given the lack of toxicity information for most taxa.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							bounding estimate.			
81.	USEPA	6/11/16	6.2.1	Cyanide	49	38b	b. Last Sentence: It states "The marine acute criterion was increased from 1.0 μg/L to 5.5 μg/L, and the chronic criterion was increased slightly from 1.0 μg/L to 1.1 μg/L." As the report specified, EPA-directed hierarchy of screening levels (SLs) is used in the report. Thus, Region 3's SL for cyanide (1.0 μg/L), which is the first source on the hierarchical order should be used. Revise this section and associated tables and attachments. The other alternative will be to have both 1 and 1.1 μg/L as a range of SL.	Disagree	Section 6 is part of the baseline risk assessment, not the risk screening. USEPA-directed screening levels were used in the screening (Section 5). Use of alternative threshold values is valid for the baseline risk assessment. See the response to ID Nos. 2, 5, and 80.	Partially Acceptable, pending addition of clarifying text and inclusion of SLs per comment.
82.	USEPA	6/11/16	6.2.2	Copper	50	39	Page 50, Section 6.2.2 Copper: It states that EPA Region 3 marine SL for copper (3.1 μg/L) was not selected as the SL even though EPA Region 3 SL is the first source in the hierarchical order. Instead, a higher level (5.6 μg/L) from NYSDEC was used as the SL for copper. The EPA-directed hierarchy of SLs, which is consistently used for Region 2 Superfund sites, should be used. Especially, a Region 3 SL for copper is available, it should be used in the BERA. Or alternatively, have both 3.1 and 5.6 μg/L as SLs indicating a range.	Disagree	Section 6 is part of the baseline risk assessment, not the risk screening. USEPA-directed screening levels were used in the screening (Section 5). Use of alternative threshold values is valid for the baseline risk assessment. See the response to ID Nos. 2 and 5.	Acceptable, pending addition of clarifying text.
83.	USEPA	6/11/16	6.2.3	Barium	50	40	Page 50, Section 6.2.3 Barium: Similar to the comment above, EPA Region 3 SL for barium (4 μg/L), rather than the value derived (404 μg/L) should be used. Furthermore, the information used to derive the value of 404 μg/L for barium was from newer studies and is based on four taxa and not eight tax as required for criteria development. Thus, the SL of 4 μg/L and not 404 μg/L should be used. Or alternatively, have both 4 and 404 μg/L as a range of SL.	Disagree	Section 6 is part of the baseline risk assessment, not the risk screening. USEPA-directed screening levels were used in the screening (Section 5). Use of alternative threshold values is valid for the baseline risk assessment. See the response to ID Nos. 2 and 5.	Acceptable, pending addition of clarifying text.
84.	USEPA	6/11/16	6.2.4	Total DDx	51	41	Page 51, Section 6.2.4 Total DDx: The section states that the SL of 0.0001 μg/L should be replaced by 0.0073 μg/L. However, per EPA-directed hierarchy of SLs which is consistently used for Region 2 Superfund sites, the SL of 0.0001 μg/L should be used, especially, since both the NYSDEC guidance and National Recommended Water Quality Criteria state the SL of 0.0001 μg/L.	Disagree	Section 6 is part of the baseline risk assessment, not the risk screening. USEPA-directed screening levels were used in the screening (Section 5). Use of alternative threshold values is valid for the baseline risk assessment. See the response to ID Nos. 2 and 5.	Acceptable. Pending addition of clarifying text.
85.	USEPA	6/11/16	6.3	Risk Characterization	52	42	Page 52, Section 6.3 Risk Characterization, First Incomplete Paragraph: Outliers that are identified in a data set from the contaminated portion of a site are likely hot spot areas that need additional investigation and attention. Simply removing outliers and recalculating hazard values is not appropriate. The conclusion for cyanide in this section is that the concentrations detected are above the chronic threshold and that there may be several areas that serve as hot spots and therefore additional focus is needed on these areas. This would also change the discussion in Section 6.4.1, which indicates that there were no spatial variations in the surface water data set that require subarea evaluation.	Disagree	Because of extensive tidal mixing, individual water column measurements cannot be ascribed to sources at the sampling location. Furthermore, except for the outliers at three locations, other estimated free CN concentrations at these three locations are consistent with data collected throughout the Study Area, which show no spatial patterns.	Partially acceptable. There is no evidence that contaminant concentrations in the water column are or are not associated with specific source areas (including underlying or nearby sediments). Given the uncertainties with linking SW data to specific locations, it is prudent to at least consider the possibility of hot spots that may be linked to SW measurements. Because the degree of tidal mixing has not been determined, do not use "extensive tidal mixing" as an explanation. Outlier discussion can be included in the uncertainty section.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
86.	USEPA	6/11/16	6.4.1	Uncertainty with Exposure Assessment	52	43	Page 52, Section 6.4.1 Uncertainty with Exposure Assessment: The carbon disulfide discussion needs to have additional information provided, such as specifically how many samples were non- detect, detect and above the comparison value. Terms such as “mostly” are not relevant.	Agree	The text will be revised.	Acceptable
87.	USEPA	6/11/16	6.4.2	Uncertainty with Measures of Effect	53	44	Page 53, Section 6.4.2 Uncertainty with Measures of Effect: It is unclear if this section is referring to the SLERA or BERA evaluation. As noted elsewhere, the distinction between screening level evaluations and the baseline evaluation needs to be clear and transparent.	Clarification	This section is referring to the BERA (see page 48, first sentence). The text will be revised to clarify.	Acceptable
88.	USEPA	6/11/16	7	Epibenthic Bivalve Risk Assessment	54	45	Page 54, Section 7 Epibenthic Bivalve Risk Assessment, First Paragraph after Bullets: The survey methods that were employed for Phase 1 and Phase 2 (e.g., grab samples for benthic community, wildlife and avian surveys) were not focused on identifying or enumerating bivalves; thus concluding that bivalves were only found at a few locations is misleading, and is counter to the information provided to EPA by the Community Advisory Group, who provided information on bivalve distribution in Newtown Creek. In addition to the ribbed mussel, numerous other species, such as oysters, clams and snails were also observed.	Disagree	Sediment grab samples in Phase 1 and Phase 2 did not find many bivalves, particularly of a size that could support collection for tissue analysis. This was discussed with USEPA over several months between October 2013 and February 2014. A February 11, 2014 statement of resolution of dispute issues included that USEPA required a caged bivalve study, preferably using mussels.	Unacceptable. Caged bivalve study is intended to evaluate bioaccumulation of contaminants for food chain models and is not intended as a component of bivalve community evaluation. Any statement about low bivalve populations must be accompanied by a disclaimer that the benthic sampling methods utilized were not designed to enumerate bivalves, and that failure to collect bivalves during benthic sampling does not indicate that bivalves are not present. Additionally, since many of the bivalve species observed by EPA (ribbed mussels, softshell clam, oysters) have been seen on vertical structures, such as bulkheads, the sampling methods employed (i.e., Eckman dredge) would not have collected bivalves attached to vertical structures, again making a statement that bivalves are only found in a few locations inaccurate.
89.	USEPA	6/11/16	7.3	Overall Risks to Bivalves	55	46	Page 55, Section 7.3 Overall Risks to Bivalves: This section will need additional information to discuss the difference between exposure point concentrations using filtered and unfiltered samples, dissolved and total concentrations, and the potential uptake of contaminated sediment by bivalves or mollusk species that are in contact with the sediment (e.g., clams, snails).	Disagree	Because the ribbed mussels that were observed in the Study Area were in bulkhead crevices or attached to pilings, the caged bivalve study was specifically designed so that the bivalves would not contact sediment. That is, the study would only be evaluating a surface water exposure pathway. A caged bivalve study design was submitted to USEPA on February 28, 2014. In providing comments on March 27, 2014, the only clarification from USEPA was that the cages not be fixed to docks or pilings because these are typically constructed of preserved wood. Lastly, because risks to bivalves were also evaluated using a tissue residue approach, it is not necessary to include a discussion of total versus dissolved or filtered versus unfiltered surface water samples.	Partially Acceptable. EPA is requesting a detailed discussion on the uncertainty associated with the bivalve evaluation, not stating that the evaluation was inadequate. The issues listed in EPA’s original comment are valid discussion points for exploring the relationship between different bivalve species, such as oysters which may have more exposure to sediments than mussels, and to establish relationships between surface water measurements and further modeling of bivalve exposure using total or dissolved measurements. EPA maintains its original comment.
90.	USEPA	6/11/16	7.3	Overall Risks to	56	47	Page 56: An additional section should be added to discuss	Clarification	Text is included in the BERA PF relevant to this comment.	Acceptable. Revised text should reference this

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
				Bivalves			life histories, habitat needs, water quality needs (DO, TSS, etc.) of the mollusk species that are present or could be present in Newtown Creek.		The BERA PF is included as an appendix to the USEPA-approved Phase 2 RI Work Plan Volume 1.	appendix.
91.	USEPA	6/11/16	8	Benthic Macroinvertebrate Risk Assessment	57	48	Page 57, Section 8 Benthic Macroinvertebrate Risk Assessment: The evaluation focuses on porewater concentrations of selected metals and PAHs without making any attempt to use the bulk sediment data to relate to the porewater measurement (for the samples where both measurements were conducted) and, as result, many contaminants that are present at highly elevated concentrations are ignored (e.g., most pesticides).	Clarification	The best available science is that porewater is the primary route of exposure to chemicals in sediment. USEPA scientists (Burgess et al. 2013) have developed guidance that recognizes the limits of bulk sediment-based evaluations and recommends porewater-based bioavailability evaluations for benthic organisms (USEPA 2003, 2005b, 2012; Burgess 2009). Also see the response to ID No. 29. It is not uncommon to have elevated bulk sediment concentrations and low bioavailability due to partitioning to carbon. Newtown Creek has high natural and anthropogenic TOC, so it is logical that porewater concentrations of many chemicals are low. The chemicals that are elevated in porewater—PAHs and metals—are also associated with high concentrations of these compounds in bulk sediment. This is not the case with other CERCLA chemicals. The benthic invertebrate evaluation focused on PAHs and metals through a rigorous screening process that identified them as bioavailable COPECs. For example, pesticides were not detected in porewater at concentrations that pose a risk because they are not bioavailable.	Partially acceptable. While porewater may be a primary route of exposure for many sediment-associated contaminants, it must be recognized that exposure to particulate-sorbed contaminants can also be important. Revision of the text is needed.
92.	USEPA	6/11/16	8.1	Surface Water Chemistry	58	49	Page 58, Section 8.1 Surface Water Chemistry, First Incomplete Paragraph: Reference the table that shows this comparison.	Agree	The text will be revised to include a reference to the appropriate table.	Acceptable
93.	USEPA	6/11/16	8.2	Benthic Biota Tissue	58	50	Page 58, Section 8.2 Benthic Biota Tissue, Last Paragraph: Add "represented by polychaetes" to the end of the paragraph, since test organisms represent Study Area BMI.	Agree	The text will be revised.	Acceptable
94.	USEPA	6/11/16	8.3	Sediment Quality Triad	59	51a	Pages 59 and 60, Section 8.3 Sediment Quality Triad: a. Page 59, First Incomplete Paragraph, Last Sentence: It states "The surface sediment chemistry, benthic community, sediment toxicity, and porewater chemistry data are described in Sections 4.2.4.1, 4.3.4.2…..". Revise this sentence. Those subsections (e.g., Section 4.2.4.1) describe what samples were collected, what the results of samples were used for, and how the toxicity tests were run. There is no discussion of data. Revise this sentence to be more specific.	Agree	The text will be revised to be more specific.	Acceptable
95.	USEPA	6/11/16	8.3	Sediment Quality Triad	60	51b	b. Page 60, First Incomplete Paragraph: The reference envelope approach, which treats all reference areas as a single group, needs to be refined to provide a comparison against the four categories of reference areas also.	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. See EPA responses to ID Nos. 3 and 12.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
96.	USEPA	6/11/16	8.3.1.1	Sediment Chemistry	61	52	Page 61, Section 8.3.1.1 Sediment Chemistry, Fourth Bullet: Add "(alpha and beta)" to the bullet after "chlordane". Additionally, indicate if individual PAHs and dioxin/furans were identified also.	Agree	The list of sediment COPECs will be updated.	Acceptable
97.	USEPA	6/11/16	8.3.1.2	Porewater Chemistry	62	53	Page 62, Section 8.3.1.2 Porewater Chemistry: This section is confusing. Revise to clarify what porewater chemistry data were used in the evaluation. Additional information that compares bulk sediment to porewater also needs to be included in the document. In addition, the first paragraph identifies an extensive data set, however, it consists of an n = 32. Although this may be more than typical, it is not extensive.	Clarification	Additional discussion will be provided to clarify what porewater data were used in the evaluation. **Clarification**: The BERA triad dataset represents the entire Study Area and four reference areas. The sample data consist of high-resolution analytical chemistry data for porewater metals, PAHs, pesticides, and PCBs. Data include field samples and toxicity test replicate beaker samples. In addition, these data are synoptic with other triad data. This is truly more than typical. Also see the response to ID No. 91.	Partially acceptable. Pending inclusion of text comparing porewater contaminant concentrations to those in bulk sediment.
98.	USEPA	6/11/16	8.3.2.1	Benthic Community Data	64	54	Page 64, Section 8.3.2.1 Benthic Community Data, Last Sentence: It states "……. The Phase 2 benthic community data provided in Attachment A5." This sentence direct readers/reviewers to raw data, it should also direct readers/reviewers to the summary tables. Summary tables should be prepared and presented in the report.	Agree	Summary tables will be presented in the main body of the draft BERA report.	Acceptable
99.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	65 to 67	55a	Pages 65 to 67, Section 8.3.2.3 Benthic Community Results: a. This section is very difficult to follow. It appears intended to present benthic community results including richness, abundance, percentage of pollution-indicative benthic community, and WBI scores. With the exception of the reference to Table 8-2 on benthic community dominance (Table 8-2), readers/reviewers are directed to figures and attachment C1 for results. Results must be summarized and presented in table(s) for the Study Area and for individual reference areas. If results are presented in tables discussed in other sections, then the text should direct readers/reviewers to those tables. For example Tables 8-3a and 8-3b present WBI scores, which are not mentioned in this section at all. These two tables should be referenced in this section.	Agree	The report will be revised to present summary tables and clarify text where appropriate.	Acceptable
100.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	65 to 67	55b	b. Confirm that Leitoscoloplos robustus is "Not Pollution Indicating or Sensitive".	Clarification	Confirmed. Adams et al. (1998) indicates that *Leitoscoloplos robustus* is neither Pollution Indicating nor Sensitive.	Acceptable
101.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	66	55c	c. Page 66, Second Bullet: The discussion on amphipods, bivalves and gastropods is biased in the conclusion reached. None of the collection methods specifically targeted amphipods, bivalves or gastropods. Given this, a value of less than 3% for observations is not a reliable value.	Disagree	The NCG believes the grab sample collection method used will collect/target amphipods, bivalves, or gastropods. References and supporting documentation will be included where appropriate.	Partially acceptable. Pending additional text supporting assumptions that sampling methods are appropriate for these organisms due to many of the organisms being on vertical structures. See EPA responses to ID No. 38 and ID No. 88.
102.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	66	55d	d. Page 66, Third Bullet: Discuss if low values may have been outliers or related to collection	Agree	The text will be modified to include a discussion of these results.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							methods.			
103.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	67	55e	e. Page 67, First Paragraph, Third Sentence: It states "Another polychaetes, Eteone heteropoda, is an important carnivore/omnivore in the Study Area (see Table 8-2)". Revise this sentence. This species was present (>1%) in Newtown Creek and tributaries and Turning Basin in 2012 spring and 2014 summer. It was also present in reference areas in both spring and summer 2014 (also shown in Table 8-2). Additionally, the last sentence indicates that the WBI score is strongly influenced by a few species, which may indicate that this is not the best method to use for the evaluation.	Clarification	The text will be revised as appropriate. However, the taxa listed are the most dominant taxa. Other taxa are less dominant. In addition, the WBI score will be affected by the dominance of taxa, especially if pollution tolerant. The abundance metric itself will be influenced by dominant taxa. The dominance of a few taxa shows that the area is stressed.	Acceptable
104.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	67	55f-i	f. Statistical comparisons of results collected should be performed to verify the conclusive statements made in this section such as "similar to the reference areas", "spring 2014 generally was not different from that observed in spring 2012". Specifically the following statistical comparisons should be made: i. Study Area Spring 2012 vs. Study Area Spring 2014	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by original comment. Also see EPA response on ID No. 3 and 12.
105.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	67	55f-ii	ii. Study Area Summer 2012 vs. Study Area Summer 2014	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment.
106.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	67	55f-iii	iii. Study Area 2014 Spring vs. Reference Areas 2014 Spring • Study Area vs. Westchester Creek • Study Area vs. Head of Bay • Study Area vs. Spring Creek • Study Area vs. Gerritsen Creek	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment.
107.	USEPA	6/11/16	8.3.2.3	Benthic Community Results	67	55f-iv	iv. Study Area 2014 Summer vs. Reference Areas 2014 Summer • Study Area vs. Westchester Creek • Study Area vs. Head of Bay • Study Area vs. Spring Creek • Study Area vs. Gerritsen Creek	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment.
108.	USEPA	6/11/16	8.3.2.4	Study Area and Reference Area Benthic Community Comparison	67	56a	Page 67, Section 8.3.2.4 Study Area and Reference Area Benthic Community Comparison: a. First Paragraph: The WBI scores presented for the reference areas of 1.13 need to be reassessed to determine if there are outliers or sample locations that do not meet acceptability criteria. Additionally, results from Newtown Creek need to be compared to each reference category.	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment.
109.	USEPA	6/11/16	8.3.2.4	Study Area and Reference Area Benthic Community	67	56b	b. First and Second Bullets: These two bullets direct readers/reviewers to Figure 8-1 for the results. However, Table 8-3a lists results. Add "Table 8-3a" to these two bullets.	Agree	The text will be revised to add the correct citations.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
				Comparison						
110.	USEPA	6/11/16	8.3.2.4	Study Area and Reference Area Benthic Community Comparison	67	56c	c. Third and Fourth Bullets: Same as above. Add "Table 8-3b" to these two bullets.	Agree	The text will be revised to add the correct citations.	Acceptable
111.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors; **and Table 8-3c**	68	57a	Pages 68 to 70, Section 8.3.2.5 Benthic Community Stressors **(This comment also applies to Table 8-3c)**: a. Page 68, Second Paragraph: It states "…percent fines and TOC,…". Phase 1 TOC values should be adjusted per EPA's direction, then the relationship between the benthic community and TOC should be re-evaluated.	Comply	We presume USEPA is referring to Figure 8-9. Although the NCG does not agree with using adjusted Phase 1 TOC data because the original Phase 1 data were rejected, to be consistent with the approach in the RI, the NCG will present the information in Figure 8-9 two ways; one by deleting samples for which no TOC re-analyses were performed, and two, by using adjusted Phase 1 TOC data. The relationship between benthic community and TOC will then be re-evaluated.	Acceptable
112.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68	57b	b. Page 68, Third Paragraph: The figures referenced do not support the conclusion that DO is the primary factor related to WBI. This line of evidence needs to be revised. The subsequent paragraphs that discuss the DO in this section are also very weakly supported by the data.	Disagree	The NCG believes that the data support a conclusion that low DO is an important factor contributing to poor health of the benthic community at some locations/seasons. The text and figures will be revised to clarify this line of evidence.	Partially acceptable. Pending revisions to text and figures. See response to ID No. 250 for specific issues to address.
113.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68 to 70	57c	c. Discussions on relationship between WBI and DO, and taxa richness, percentage of pollution-indicative taxa should be revised following the comments below.	Comment Noted	See responses to ID Nos. 114 through 116.	Unacceptable. EPA stands by EPA original comment. See responses to ID Nos. 114 – 116.
114.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68 to 70	57d	d. Statistical approach for comparisons of WBI, richness, abundance, and DO at the Study Area and reference areas may not be totally appropriate. Reference areas were only sampled in 2014 during Phase 2; the Study Area was sampled in 2012 and 2014 during both Phase 1 and Phase 2. Existing data from reference area are may not be fully comparable to that from the Study Area. Therefore, comparisons between the Study Area and reference areas other than 2014 data should be interpreted with caution, and uncertainties associated with these comparisons should be discussed in the Uncertainty section of the document. Additionally, for statistical comparison, the stations at the Study Area were divides into two sets (Newtown Creek from CM 2.26 to the mouth, and Tributaries and Turning Basin) due to "evident" differences in DO and WBI relationship. However, the four reference areas were combined and treated as one dataset to compare with Newtown Creek and Tributaries and the Turning Basin statistically. The report should not ignore the fact that these four reference areas represent four distinctive areas	Agree/ Disagree	The NCG agrees that Study Area and reference area comparisons other than for 2014 data should be interpreted with caution, and uncertainties associated with these comparisons should be discussed in the uncertainty section of the document. Also see the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment. Also see EPA response on ID Nos. 3 and 12.

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							with different characteristics. The Study Area should be compared with data from individual reference areas rather than the combined data from the four reference areas.			
115.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68 to 70	57e-i	e. Make the following changes: i. When statistically compared with reference areas, only the following comparisons can be made: • Study Area Spring 2014 vs. Reference Areas Spring 2014 o Newtown Creek (from CM 2.26 to the mouth) vs. Westchester Creek o Newtown Creek (from CM 2.26 to the mouth) vs. Head of Bay o Newtown Creek (from CM 2.26 to the mouth) vs. Spring Creek o Newtown Creek (from CM 2.26 to the mouth) vs. Gerritsen Creek • Study Area Summer 2014 vs. Reference Areas Summer 2014 o Newtown Creek (from CM 2.26 to the mouth) vs. Westchester Creek o Newtown Creek (from CM 2.26 to the mouth) vs. Head of Bay o Newtown Creek (from CM 2.26 to the mouth) vs. Spring Creek o Newtown Creek (from CM 2.26 to the mouth) vs. Gerritsen Creek • Tributaries and Turning Basin Spring 2014 vs. Reference Areas Spring 2014 o Tributaries and Turning Basin vs. Westchester Creek o Tributaries and Turning Basin vs. Head of Bay o Tributaries and Turning Basin vs. Spring Creek o Tributaries and Turning Basin vs. Gerritsen Creek • Tributaries and Turning Basin Summer 2014 vs. Reference Areas Summer 2014 o Tributaries and Turning Basin vs. Westchester Creek o Tributaries and Turning Basin vs. Head of Bay o Tributaries and Turning Basin vs. Spring Creek o Tributaries and Turning Basin vs. Gerritsen Creek	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment. Also see EPA response on ID Nos. 3 and 12.
116.	USEPA	6/11/16	8.3.2.5	Benthic Community	68 to	57e-ii	ii. When statistically compare with reference areas, delete the following comparisons:	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment. Also see EPA response on ID Nos. 3

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				Stressors	70		• Newtown Creek Spring 2012 and 2014 vs. Reference Areas Spring 2014 • Newtown Creek Summer 2012 and 2014 vs. Reference Areas Summer 2014 • Newtown Creek Spring 2012 vs. Reference Areas Spring 2014 • Newtown Creek Summer 2012 vs. Reference Areas Summer 2014 • Tributaries and Turning Basin Spring 2012 and 2014 vs. Reference Areas Spring 2014 • Tributaries and Turning Basin Summer 2012 and 2014 vs. Reference Areas Summer 2014 • Tributaries and Turning Basin Spring 2012 vs. Reference Areas Spring 2014 • Tributaries and Turning Basin Summer 2012 vs. Reference Areas Spring 2014			and 12.
117.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68 to 70	57e-iii	iii. State the p-value for statistical significance in the text.	Agree	The text will be revised to include the p-value, which was 0.05.	Acceptable
118.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	68 to 70	57e-iv	iv. Since statistical analyses were performed, revise sentences such as ".. differences were not apparent" to ".. no significant differences".	Agree	The text will be revised as appropriate.	Acceptable
119.	USEPA	6/11/16	8.3.2.5	Benthic Community Stressors	70	57f	f. Page 70, First Complete Paragraph: This paragraph presents NYCDEP's DO data trend from 2011 to 2015, showing seasonal changes. Note that monthly DO values, while important, should be supplemented by lowest observed values. BMI and other aquatic life are most affected by critical minimums, even if exposure duration is short. For example, if a monthly average DO is within acceptable limits, a short term (a day or two) exposure to critical minimum DO can cause mortality and can have longer term impacts on BMI abundance and diversity. In addition to average DO values by month, lowest DO values by month (or by week or day, if available) should be provided.	Agree	Data will be supplemented and evaluated where available and applicable.	Acceptable

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120.	USEPA	6/11/16	8.3.3	Toxicity	71	58a-i	Pages 71 and 72, Section 8.3.3 Toxicity, Second Set of Bullets: a. Page 71: i. First Bullet of Second Set of Bullets: EqP is not fully applicable to metals. This sentence should refer to organic chemicals specifically.	Disagree	Equilibrium partitioning (EqP) is applicable to metals. USEPA has an EqP document for metals: *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc)* (USEPA 2005b). The tiered evaluation hierarchy for chemical measurement is identical for metals and non-polar organics: bulk sediment screening, then EqP, then direct porewater measurement (Burgess et al. 2013).	Partially acceptable. While EPA's EqP may be generally applicable to metals, it is important to note the substantial uncertainty in this approach. Metals bioavailability and toxicity is highly site-specific, and depends on numerous factors that are to be considered in these evaluations. See EPA response to ID No. 9.
121.	USEPA	6/11/16	8.3.3	Toxicity	71	58a-ii	ii. Third Bullet: Porewater collection is associated with uncertainties, so the accuracy of porewater analyses may be low (i.e., may not accurately reflect in-situ conditions). Uncertainty associated with porewater collection should be discussed in the uncertainty section. The use of porewater may under estimate the contaminants ingested through feeding on contaminated sediment.	Clarification / Disagree	All analytical measurements have some uncertainty; however, the state-of-the-art porewater sampling and analysis methods applied in the BERA have substantially less uncertainty than other estimates of porewater exposure, such as EqP. See USEPA (2012) tiered approach for implementing site-specific equilibrium sediment benchmarks (EPA/600/R-02/012) and Burgess et al. (2013). Regarding the use of porewater and ingested sediment, the following is an excerpt from Burgess et al. 2013: *Equilibrium partitioning asserts only that any simultaneous exposure through ingested sediment reflects the same degree of chemical activity (i.e., bioavailability) indicated by the concentration in interstitial water, assuming that no transformations occur within the gut that significantly change chemical activity. Thus, EqP predicts bioavailability using partition coefficients between sediment particles (including binding phases contained therein) and the interstitial water. With this information, an accurate estimate of a sediment contaminant's bioavailable concentration can be generated and the likelihood of adverse effects due to that chemical can be predicted.* The porewater data collected for the BERA is a direct measure of the contaminant's bioavailable concentration and is an important line of evidence in assessing ecological exposure and risk. See also the response to ID No. 91.	Partially acceptable. Pending addition of expanded discussion of uncertainty.
122.	USEPA	6/11/16	8.3.3	Toxicity	72	58b	b. Page 72, First Bullet of First Set of Bullets: This bullet should discuss the potential effects of cumulative exposures to all potentially hazardous chemicals (even if concentrations of individual chemicals are below selected benchmarks, thresholds or TRVs). Additionally, the term "unresolved complex mixtures" (UCMs) and the associated evaluation should be moved entirely to the uncertainty section as UCMs are not CERCLA wastes.	Disagree	The purpose of screening COPECs prior to conducting the baseline risk assessment is to focus the work to refine the extent that potential risk drivers actually contribute to quantifiable risk. In order to meet the three objectives USEPA identified in ID No. 29, it will be necessary to conduct the evaluations of relationships between bulk sediment and porewater and address confounding factors that modify that relationship. See also the responses to ID Nos. 29 and 91.	Unacceptable. EPA stands by EPA original comment.
123.	USEPA	6/11/16	8.3.3.1 and 8.3.3.2	Toxicity Test Data and Toxicity	72 to	59a	Pages 72 to 75, Section 8.3.3.1 Toxicity Test Data and Section 8.3.3.2 Toxicity Reference Area Envelope:	Agree	The report will be revised to include data summaries and discussions where appropriate.	Acceptable

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				Reference Area Envelope	75		a. Both of these sections mainly present toxicity testing procedures and do not discuss results, but direct readers/reviewers to tables/figures. Data should be summarized and discussed in the text.			
124.	USEPA	6/11/16	8.3.3.1	Toxicity Test Data	72	59b	b. Page 72, Section 8.3.3.1 Toxicity Test Data, Last Paragraph: Delete "Table 8-4c". This table lists porewater chronic threshold values and does not present any test data.	Clarification	Table 8-4c presents the TRVs that are the basis of the screening of the porewater data that are summarized in Tables 8-4a and 8-4b.	Acceptable. Pending addition of clarifying text.
125.	USEPA	6/11/16	8.3.3.2	Toxicity Reference Area Envelope	74	59c	c. Page 74, Section 8.3.3.2 Toxicity Reference Area Envelope, First Paragraph: This paragraph indicates that the four selected reference areas were considered a single data set, however, the reason four areas were selected that represented four separate categories was to collect data to determine if specific sources of contamination (i.e., industrial discharges and CSO discharges) could be distinguished from each other. Site data should be compared individually to each reference area.	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment. Also see EPA response on ID Nos. 3 and 12.
126.	USEPA	6/11/16	8.3.3.2	Toxicity Reference Area Envelope	74	59d	d. Page 74, Section 8.3.3.2 Toxicity Reference Area Envelope, Second Paragraph: The reference comparison statistic that was chosen was the 95% lower confidence limit on the 5% percentile. Provide a reference for using this statistic.	Agree	Additional rationale for selecting the statistic and supporting reference will be provided.	Acceptable
127.	USEPA	6/11/16	8.3.3.2	Toxicity Reference Area Envelope	75	59e	e. Page 75, Section 8.3.3.2 Toxicity Reference Area Envelope, First Paragraph: The reference data needs to be screened against acceptability criteria (i.e., the numeric comparisons used in work plan phase) to identify any stations that do not meet the criteria.	Disagree	See the response to ID Nos. 3 and 12.	Unacceptable. EPA stands by EPA original comment. Also see EPA response on ID Nos. 3 and 12.
128.	USEPA	6/11/16	8.3.3.3.1	Bulk Sediment Chemistry	76	60a	Page 76, Section 8.3.3.3.1 Bulk Sediment Chemistry: a. In this Section and in the rest of the BERA Report, TOC values and total PCB congener concentrations need to be adjusted based on EPA's direction.	Comply	See the response to ID No. 14.	Acceptable
129.	USEPA	6/11/16	8.3.3.3.1	Bulk Sediment Chemistry	76	60b	b. Second Paragraph, Last Sentence: It states "Table 8-8b indicates that the probability that the observed correlations are random are very low." However, this table shows correlation probability values for total fine (%) are high, especially with nickel (0.9894), copper (0.925), and 10-day survival (0.8727). Revise this sentence.	Agree	The text will be revised.	Acceptable
130.	USEPA	6/11/16	8.3.3.3.1	Bulk Sediment Chemistry	76	60c	c. Last Paragraph, Last Two Sentences: It states "Although increasing bulk sediment COPEC concentrations are associated with increasing toxicity, the actual exposure to the test organisms may not be best explained from bulk sediment data." This may be true; however, the fact that increasing sediment COPEC concentration are associated with increasing	Clarification	See the response to ID No. 91. The text will be revised.	Acceptable. Pending review of revised text.

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							toxicity cannot be ignored. More justification is need to support this statement.			
131.	USEPA	6/11/16	8.3.3.3.2	AVS, SEM, and Metal Speciation	77	61	Page 77, Section 8.3.3.3.2 AVS, SEM, and Metal Speciation, Second Paragraph: This paragraph states "statistically significant" between pre-test and post-test for ΣSEM-AVS and in situ ΣSEM-AVS. Direct readers/reviewers to the section and tables where the results of statistical analyses are presented.	Agree	The text will be revised to reference appropriate data tables.	Acceptable
132.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	78 to 80	62a	Pages 78 to 80, Section 8.3.3.4 Toxicity and Porewater Chemistry: a. This section only discusses TU above 1 for total PAH and total SEM metals. However, there are individual chemicals having TU above 1. They should be discussed and not ignored.	Disagree	The list of chemicals in porewater analyzed in Section 8.3.3 was established in the COPEC screening step. PAHs and SEM were addressed as sums consistent with USEPA guidance rather than as individual chemicals within those groups. Also, see the response to ID No. 15.	Partially acceptable. Pending inclusion of additional text that discusses potential toxicity of individual metals and PAHs. This discussion is critical because toxicity based on simultaneous exposure to multiple potentially toxic chemicals may be influenced by synergistic or antagonistic effects. Assuming additivity is appropriate, but additivity may or may not describe actual conditions.
133.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	78	62b-i	b. Page 78: i. Second Paragraph, First Sentence: It states to see Table 8-4c for detected porewater chemicals exceeding the chronic thresholds. Present the correct table number for this information. Table 8-4c only lists the porewater chronic threshold values and there are no porewater concentrations and no comparison with chronic thresholds.	Agree	The text will be revised to reference the correct table.	Acceptable
134.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	78	62b-ii	ii. Second Paragraph, Second Sentence: It states "chemicals having exceedance". Provide table presenting this information.	Agree	The text will be revised to clarify what is being referred to and a table will be provided if appropriate.	Acceptable
135.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	79	62c-i	c. Page 79: i. First Complete Paragraph: Same comment as above. Total PCB congener concentrations and comparisons with chronic threshold maximum concentrations should be presented in a table.	Clarification	We are not sure if this reviewer meant "comparisons of chronic threshold to maximum concentrations." This is presented in Table 8-4a.	Acceptable
136.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	79	62c-ii	ii. Bullets: The table number referred in these two bullets (Table 8-4c) is incorrect. Cite the correct table number for these two bullets.	Clarification	The bullets are referring to the chronic values.	Partially acceptable. Pending addition of clarifying text.
137.	USEPA	6/11/16	8.3.3.4	Toxicity and Porewater Chemistry	80	62d	d. Page 80, First Paragraph, Last Sentence: It states "Without site-specific toxicity identification data, assuming additivity is a reasonable approximation of these and other porewater chemical contributions to toxicity." Define "site-specific toxicity identification data". Additionally, as stated earlier, the contribution of individual COPECs to toxicity should not be ignored.	Agree/ Clarification	The toxicity identification evaluation definition will be provided. We are unclear about the comment regarding individual COPECs. PAHs and metals are assumed to be additive, consistent with USEPA sediment assessment guidance.	Partially Acceptable Also, see response to ID No. 132. Proposed revision to text is acceptable, but contribution of individual COPECs to toxicity needs to be considered.
138.	USEPA	6/11/16	8.3.3.5.1	Standard Confounding Factors	80	63	Page 80, Section 8.3.3.5.1 Standard Confounding Factors, Second Paragraph, Third Sentence: Section 8.3.3.3, Toxicity and Sediment Chemistry, shows the high degree of correlation between toxicity and bulk sediment	Disagree	The BERA used site-specific porewater, a direct measurement, as the primary measurement endpoint, consistent with USEPA guidance (USEPA 2003, 2005b, 2012) and Burgess (2009). As noted in the response to ID No. 91,	Unacceptable. All discussion on confounding factors should be presented in Uncertainty Section. In addition, response appears to assume that porewater contaminant

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							chemistry for individual contaminants (PAHs, PCBs, Pesticides, Metals). Although not reported, there is also a high degree of correlation with chemical indices such as logistic regression models (LRMs) (Field and Norton, 2014; Field et al 2002), mean ERM and PEC quotients, or PAH34 toxic units (EPA 2003). However, the BERA ignores magnitude of exceedance of sediment benchmarks. The sentence about organic carbon and grain size correlations with bulk sediment concentrations making it difficult to use sediment chemistry should be removed. The predictive power of chemical indices in Newtown Creek (and the reference areas) is strong.		it is not uncommon to have high bulk sediment chemical concentrations and low porewater concentrations for those same chemicals due to partitioning to carbon for non-polar organic compounds or binding with sulfides for metals. Newtown Creek has high TOC and AVS. Because of partitioning and binding, high bulk sediment concentrations do not always result in elevated porewater exposure, as was the case for pesticides and PCBs in Study Area sediment. Generic sediment benchmarks like ERMs were correctly used in the BERA as conservative screening benchmarks and used to identify COPECs. Bulk sediment correlations with toxicity (e.g., Field and Norton 2014) are associations and provide limited information about the chemical exposures actually causing toxicity. It is well established in the scientific literature that bulk sediment alone is an incomplete measure of exposure (Burgess et al. 2013). Only porewater provides the ability to empirically measure exposure and is, therefore, the most robust line of evidence. The predictive power of bulk sediment chemical indices are actually weak compared to direct porewater measurement. Bulk sediment assessment approaches using occurrence-based benchmarks, like the LRMs and mean ERM quotient, are among the weakest lines of evidence because they do not address sediment complexity and true exposure. The apparent "predicative power" is misleading because the causative agent cannot be established, only an association can be made. While bulk sediment measures and toxicity are correlated, the chemicals are also highly correlated among themselves. Without a mechanistic approach, like equilibrium partitioning, or better yet, direct porewater measures, actual exposure cannot be estimated or known. The planning for the BERA toxicity assessment recognized this fact and applied the best available science, consistent with USEPA guidance, to develop a program that directly measured porewater to establish exposure. With regards to the correlation of toxicity and bulk sediment PAH (34) toxic units (USEPA 2003), yes, it is significant. In fact, so are the correlations between other generic PAH benchmarks. However, not surprisingly, the relationship between porewater PAH (34) TU and bulk sediment PAHs shows that site-specific exposure cannot be predicted using bulk sediment measures. This example demonstrates the pitfalls of bulk sediment chemical indices and why direct porewater measures are the strongest line of evidence for establishing exposure. See the responses to ID Nos. 9 and 91.	concentrations are stable and are the only sediment-associated exposures of concern. Ingestion of particulate-sorbed contaminants is also a concern for some receptors, and sediment porewater contaminant concentrations likely vary temporally and spatially. Sediment bulk chemistry data provides a general indication of level of "potentially bioavailable contamination", and as such should not be ignored. Both sediment bulk chemistry and sediment porewater contaminant concentrations should be viewed as important, related but independent lines of evidence.

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139.	USEPA	6/11/16	8.3.3.5.2	Anthropogenic Confounding Factors	82 to 85	64	Pages 82 to 85, Section 8.3.3.5.2 Anthropogenic Confounding Factors: This entire section provides a lengthy discussion on non-CERCLA hazardous substances such as petroleum-based hydrocarbon unresolved complex mixture, and mineral oil. This section implies that these non-CERCLA hazardous substances are unique and have great impact on sediment toxicity and should be evaluated independent of CERCLA hazardous substances. As previous discussions between NCG/the City and EPA on BERA PF, EPA made it very clear that for Superfund sites, only CERCLA hazardous substances are to be evaluated in the BERA. If NCG feels strongly that these “anthropogenic confounding factors” should be included in the BERA, the discussion should be presented in the uncertainty section. Additionally, the 10-day test data should be presented, in spite of arguments made in the report that they are biased toward low survival. The discussion of anthropogenic confounding factors, such as non-PAH petroleum hydrocarbons and sulfide, is distracting and largely irrelevant. There is no evidence provided to support that toxicity is more likely due to mineral oil or sulfides, rather than the extremely high concentrations of hazardous substances such as PAHs, PCBs, and copper.	Disagree/ Clarification	We understand that the focus of the risk assessment is to address CERCLA hazardous substances. To accurately describe the risk contribution of CERCLA hazardous substances, it is also necessary to address confounding factors. The identification of confounding factors was done in an iterative, scientific process that was performed in order to refine the concentration-response relationship for the CERCLA hazardous substances. Separating the discussion of anthropogenic confounding factors into the uncertainty section would unrealistically constrain the analysis of sediment toxicity. As demonstrated in the BERA, the rate of decision errors is substantial when confounding factors are not addressed. Not addressing confounding factors with CERCLA hazardous substances impedes the ability to address comments such as ID Nos. 9 and 29. (In ID No. 9, USEPA requested additional analysis of the relationship between porewater and bulk sediment chemistry. In ID No. 29, USEPA noted that the BERA should provide the basis for developing cleanup levels.) The comment regarding presenting 10-day test data in Section 8.3.3.5.2 is unclear. The Section 8.3.3.5.2 discussion does not specifically address either the 10-day or 28-day test results but provides the basis for the anthropogenic confounding factors analysis that is conducted in Section 8.3.3.6. The impact of the anthropogenic confounding factors analysis on the interpretation of the 10-day test results are presented in Section 8.3.3.6.	Unacceptable. EPA stands by the original comment.
140.	USEPA	6/11/16	8.3.3.6	Toxicity Concentration-Response Evaluation	86 to 87	65a	Pages 86 to 87, Section 8.3.3.6 Toxicity Concentration-Response Evaluation: a. There is no summary table listing TUs. The text simply directs readers/reviewers to figures. Although figures (Figures 8-25 and 8-26) give general overview, there are no TU values by location to verify statements listed on these pages, especially Figure 8-25, which is on log scale. Tables showing TUs by triad location for PAH, SEM metals, and COPECs must be provided.	Agree	Tables will be added.	Acceptable
141.	USEPA	6/11/16	8.3.3.6	Toxicity Concentration-Response Evaluation	86 to 87	65b	b. Provide a clear description of the purpose, content, and results of Table 8-9 Summary of Concentration-response Prediction Error Rates with or without Confounding Factor Stations. The text directs readers/reviewers to Attachment D2. However, this attachment only shows input and output of the software.	Agree	The text will be added to provide the requested information.	Acceptable
142.	USEPA	6/11/16	8.3.3.6.1	Concentration-Response Evaluation and Contingency	91	66	Page 91, Section 8.3.3.6.1 Concentration-Response Evaluation and Contingency Analysis: This subsection attributes “error rates” to samples that do not correspond to the predictions based on PAH toxic units	Disagree/ Clarification	PAHs and SEM were identified as the only bioavailable COPECs with measured concentrations exceeding conservative toxicity reference values. There is no reason to include “all other contaminants present in elevated	Unacceptable. Bioavailability can be estimated but is likely highly variable and for the most part unknown. Contaminants associated with elevated concentrations may or may not be

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				Analysis			and SEM metals toxic units which essentially ignores all other contaminants present at elevated concentrations in the sediment.		concentrations in sediment" because only PAHs and metals are bioavailable in porewater.	bioavailable at any particular location or time, and these should be considered potentially bioavailable.
143.	USEPA	6/11/16	8.4	Overall Benthic Macroinvertebrate Risk Characterization	92	67	Page 92, Section 8.4 Overall Benthic Macroinvertebrate Risk Characterization: Add "porewater" to the sentence.	Agree	The sentence will be revised as requested.	Acceptable
144.	USEPA	6/11/16	8.4.1	Chemistry	92	68	Page 92, Section 8.4.1 Chemistry, Second Bullet: This bullet states "The accumulation of bioaccumulative contaminants in polychaetes is not sufficient to cause an adverse effect to Study Area polychaetes, and therefore, to Study Area benthic macroinvertebrates." Add text to clarify that this conclusion is based on the assumption that polychaetes are toxicologically representative of (or would respond to exposure similarly to) other non-polychaete BMI. In addition, the utility of evaluating the accumulation of bioaccumulative contaminants in polychaetes was to evaluate the trophic transfer to upper-level consumers, such as fish, birds and mammals.	Clarification	It is true that one of the uses of the data is to evaluate the trophic transfer to upper-level consumers. However, the data were also collected to answer one of the risk questions in the USEPA-approved Phase 2 RI Work Plan Volume 1—*Is the accumulation of contaminants from Study Area surface sediments in Nereis sufficient to cause adverse effects to receptors represented by test organisms?* The text will be modified to acknowledge the uncertainty associated with extrapolating the evaluation of polychaete tissue effects to non-polychaete BMI.	Acceptable
145.	USEPA	6/11/16	8.4.2	Benthic Community	93	69a	Page 93, Section 8.4.2 Benthic Community: a. First Bullet, Second Sentence: This sentence would be clearer if the last part of the sentence simply stated "No BMI were observed".	Agree	The sentence will be clarified as requested.	Acceptable
146.	USEPA	6/11/16	8.4.2	Benthic Community	93	69b	b. Fourth Bullet: DO is not a CERCLA hazardous substance, but low DO can result from multiple sources, including nutrient enrichment and degradation of organic contaminants that may fall under CERCLA. This should be discussed. Also, as mentioned in previous comments, the association with DO is not as evident as described in this report.	Clarification	It is not clear how nutrient enrichment is related to the CERCLA contaminants. However, the NCG agrees that causes of low DO can be added to the discussion. Additional text will be added to strengthen the discussion regarding the association between DO and the health of the benthic community.	Acceptable
147.	USEPA	6/11/16	8.4.3	Toxicity	93	70a	Pages 93 and 94, Section 8.4.3 Toxicity: a. Page 93, First Bullet: Add names of test organisms, and add that samples are sediment samples. This comment also applies to subsequent bullets.	Agree	The text will be added to address this comment.	Acceptable
148.	USEPA	6/11/16	8.4.3	Toxicity	94	70b	b. Page 94, Fourth Bullet: This bullet should be revised to clarify that static and unfed conditions refer to the 10-day toxicity test, not the 28-day toxicity test.	Agree	The text will be revised.	Acceptable
149.	USEPA	6/11/16	8.4.4	Overall Summary of Sediment Quality Triad Results	95	71	Page 95, Section 8.4.4 Overall Summary of Sediment Quality Triad Results, First Incomplete Sentence at Top of Page: It states "… they are likely related to low DO concentrations that are less than 3.0 mg/L". This conclusion may be true for individual COPECs, but adverse effects may also be due, in part, to the cumulative effects of simultaneous exposure to multiple chemicals (even if concentrations of individual chemicals are below thresholds or SLs). This potential should be recognized and discussed, especially given the number of chemicals detected for which SLs are unavailable.	Clarification	The analysis of the benthic community data included an evaluation of the potential for COPEC-related impacts to the benthic community. This evaluation was conducted in the Study Area and all the reference areas, over a wide range of COPEC concentrations. Regardless of concentrations of the sediment COPECs evaluated, there is no clear relationship between COPEC concentrations and WBI scores as indicated by BERA Figures 8-7 and 8-8 and Attachment C2. The uncertainties associated with detected chemicals for which SLs are unavailable will be discussed in the uncertainty section.	Partially acceptable. Pending text revisions.

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150.	USEPA	6/11/16	9	Epibenthic Decapod Risk Assessment	100	72a	Page 100, Section 9 Epibenthic Decapod Risk Assessment: a. This section is incomplete due to sediment not being evaluated, no discussion of how TRVs or CRBs were derived/chosen, no information regarding life histories or habitat needs.	Disagree	As presented in the USEPA-approved Phase 2 RI Work Plan Volume 1, the only measurement endpoint to be evaluated for the blue crab is the concentration of bioaccumulative contaminants in tissue (see Table 2-2, and BERA PF Table 7-1). Because no COPECs were identified for the blue crab in the tissue screening (Section 5), it was not necessary to discuss tissue thresholds in Section 9. Life history information for blue crab is included in Attachment F.	Unacceptable. EPA directs the NCG to the data quality objective for blue crabs in Table 2-2 in the work plan which states, "Evaluate the potential effects of contaminants on epibenthic invertebrates in the Study Area; evaluate the relationship between sediment and blue crab contaminant concentrations, including calculation of BSAFs and including uncertainty analysis associated with various mathematical formulations of the relationship; and provide input to food web models." Based upon this, the relationship of blue crabs to both surface water and sediment should be discussed in the BERA.
151.	USEPA	6/11/16	9	Epibenthic Decapod Risk Assessment	100	72b	b. First Bullet: The evaluation should be from exposure to surface water and sediment.	Disagree	See the response to ID No. 150. Surface water is only included as part of the assessment for aquatic life in general.	Unacceptable. See EPA response to ID No. 150.
152.	USEPA	6/11/16	9	Epibenthic Decapod Risk Assessment	100	72c	c. Second Bullet: Add "....represented by blue crabs." to the end of the sentence.	Agree	The text will be revised.	Acceptable
153.	USEPA	6/11/16	9	Epibenthic Decapod Risk Assessment	100	72d	d. Paragraph below Bullets: Additional information should be included that explains which species were represented by the other 46% of the shellfish that were caught.	Agree	The text will be revised.	Acceptable
154.	USEPA	6/11/16	9.4.2	Uncertainties with Measures of Effect	101	73	Page 101, Section 9.4.2 Uncertainties with Measures of Effect: Confirm that ERED and other tissue SLs are species specific. If not, then add species-to-species extrapolation of toxicity data as a source of uncertainty. This comment applies to all sections where tissue data from ERED or similar databases are discussed.	Clarification	ERED contains specific data on individual tissue vs. effect studies for many species and endpoints. Each study is species specific. SLs can be derived from the database using a variety of decision criteria. If adequate species-specific information is available, that is used. If not, it is appropriate to use an SL derived from a suitable combination of studies and species. For the blue crab, the SLs include *Daphnia magna* (water flea), *Mytilus edulis* (blue mussel), midges, and amphipods for invertebrates. Uncertainties associated with species-to-species extrapolation will be noted in this section and in others as appropriate.	Acceptable
155.	USEPA	6/11/16	10.1	Surface Water	103	74	Page 103, Section 10.1 Surface Water, Second Sentence: This sentence is only true if the most conservative threshold value was utilized. This should be discussed in the uncertainty section.	Agree	Uncertainties related to any SLs that are not derived from NRWQC will be discussed in the uncertainty section.	Acceptable
156.	USEPA	6/11/16	10.2	Porewater	104	75a	Page 104, Section 10.2 Porewater: a. First Paragraph, Seventh Sentence: Add "directly to pore water in the Study area."	Agree	The text will be revised.	Acceptable
157.	USEPA	6/11/16	10.2	Porewater	104	75b	b. Last Paragraph, Last Sentence: It states that a chronic threshold value of 50 nanograms per liter was selected to evaluate the adverse effects of porewater PCB congeners to mummichog. Additional discussion on the two tests that this value was based on should be provided.	Agree	The report will be revised to include additional discussion on the two tests relevant to the development of this threshold.	Acceptable

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158.	USEPA	6/11/16	10.3.3	Measures of Effect	105	76a	Pages 105 and 106, Section 10.3.3 Measures of Effect: a. Page 105, Footnote No. 10 and 11: Footnote 10 indicated only striped bass and mummichog were identified in the CSM. Spot, which was replaced with white perch, was also included. Footnote 11, the text indicates there were 17 studies with LOECs found in the database. Confirm whether the footnote is referring to NOECs.	Clarification	Perch did not replace spot in the BERA. The footnote is referring to LOECs.	Unacceptable. White perch did replace spot, since spot were not collected. White perch need to be evaluated.
159.	USEPA	6/11/16	10.3.3	Measures of Effect	106	76b	b. Page 106, Last Sentence: It states “Using LOECs is appropriate to assess effects at an assumed population level rather than the NOECs used in the risk screening.” Rationale for this assertion is not provided. Appropriateness for “population level” is related to the specific endpoints evaluated: it is not related to the choice of effect level to use as the quantitative basis for the toxicity assessment.	Agree	Additional text will be provided on the rationale for the use of growth/reproduction/survival-based LOECs to evaluate potential population-level effects. According to Landis et al. (1993), it is assumed that a few deaths at the population level due to exposure to a chemical would not adversely affect a healthy reproducing population of organisms. Therefore, for the risk assessment, it is appropriate to use NOAELs in a screening to be protective of all individuals, and it is appropriate to use LOAELs in the baseline analyses to be protective of a healthy reproducing population of organisms, recognizing that not every individual will be protected.	Acceptable
160.	USEPA	6/11/16	10.4.2	Exposure Model	107	77a	Page 107, Section 10.4.2 Exposure Model: a. First Paragraph: Although it is difficult to quantify, the text should recognize that surface water ingested or passing over gills may also contribute to exposure and in some cases total dose. Revise this paragraph.	Agree/ Clarification	Text will be added noting this uncertainty and will be included in the uncertainty section.	Acceptable
161.	USEPA	6/11/16	10.4.2	Exposure Model	107	77b	b. Second Paragraph, Last Sentence: Add “as adults (i.e., 4-5 years of age and older)” to the end of the sentence as young and juvenile striped bass spend the first three years of their life in smaller estuary systems, such as small streams and rivers like Newtown Creek, before joining the migration pattern observed in adult fish.	Clarification	As presented in a 7/20/16 dispute letter to USEPA, it is likely that both the Study Area and regional sources contribute to body burdens, but quantification of the proportions is premature: during the development of the bioaccumulation model, this issue will be investigated further. It is proposed that the sentence in question be revised as follows: *As described in Attachment F, research on the Hudson River stock of striped bass indicates that adult striped bass (ages 4 and above) found in the Study Area are likely part of larger sub-populations that potentially range throughout the East River, Hudson River, New York Harbor, Long Island Sound, and possibly the coastal ocean. The extent of movement, and thus the contributions of Study Area and regional COPEC exposure, for both juvenile and adult striped bass, will be evaluated during the development of the bioaccumulation modeling.*	Acceptable, pending revised text.
162.	USEPA	6/11/16	10.4.4.1	Exposure Assessment	108	78	Page 108, Section 10.4.4.1 Exposure Assessment, Last Paragraph: Provide additional justification for the best professional judgment of 1% of the diet. If specific values cannot be found, then additional estimates of sediment	Clarification	The sensitivity of the risk estimates to a range of sediment ingestion rates will be discussed in the uncertainty section. Based on the work of Booth and Gary (1993), a range of up to 2.5% will be used.	Acceptable

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							ingestion rate (i.e., 5%, 10%, 15%) should be included to bound the estimate.			
163.	USEPA	6/11/16	10.4.4.1	Exposure Assessment	110	79	Page 110, Section 10.4.4.1 Exposure Assessment, First Complete Paragraph: Additional information should be included in this paragraph to provide COPC concentrations below CM 2 and above CM 2 to explain the terms “little variation” and “increase”.	Agree	The text will be revised.	Acceptable.
164.	USEPA	6/11/16	10.5	Overall Fish Risk Characterization	111 and 112	80a	Pages 111 and 112, Section 10.5 Overall Fish Risk Characterization: a. Last Bullet starts on Page 111 and ends on page 112: Revise this bullet. Qualifiers such as "only" should be eliminated from this and all similar presentations to reduce biased interpretations. Also, stating “maximum exceedances of 3 or 9” is unclear and must be more specific. Assuming these numeric values are referring to HQs, HQs of 3 or 9 are significant and indicate unacceptable risk.	Objection/ Clarification	This bullet does not present a biased interpretation, it is based on the outcome of multiple lines of evidence used in the BERA. Multiple lines of evidence are used to increase the confidence of the risk estimates. See response to ID No. 165.	Unacceptable. EPA stands by EPA original comment.
165.	USEPA	6/11/16	10.5	Overall Fish Risk Characterization	112	80b	b. Page 112, Top Paragraph, Last Sentence: This sentence should be revised. Each line of evidence should be evaluated independently of other lines of evidence. Elevated porewater PAH concentrations are important whether or not surface water, tissue, or dietary lines of evidence are associated with exceedances. Final concluding sentence should simply state which lines of evidence suggest unacceptable risk, and which do not.	Clarification	The NCG recognizes the importance of evaluating each line of evidence independently. Conversely, there is also value in an overall weight-of-evidence approach to evaluating risks to a particular receptor group. That is why multiple lines of evidence are employed in risk assessment—to increase the confidence in the risk estimates. This section will be modified to clarify the results of each line of evidence; however, the overall weight-of-evidence discussion will also be modified to include a discussion of the relative weights that should be applied to each line of evidence so that the overall weight-of-evidence approach is relevant for decision-making.	Partially acceptable. Pending additional clarification of the text.
166.	USEPA	6/11/16	10.7.3	Fish and Crab Community Metrics – Methods	115	81	Page 115, Section 10.7.3 Fish and Crab Community Metrics – Methods: There are methods available to compare catch per unit effort which may be useful in reducing the uncertainty associated with the species richness estimates.	Comment Noted	No specific reference to a method is provided by this comment. For this reason, it is difficult to determine how CPUE can be potentially used to increase precision in species richness estimates. In general, CPUE is an index of relative abundance that accounts for differences in fishing effort by assuming constant catchability for a fish species. CPUE is typically used to compare different stocks of the same species or a fish stock over time but not different species, in part because gear performance is species and habitat specific (Hubert and Fabrizio 2007). Relative abundance as measured by CPUE (an index of abundance—the number of individuals in the population of each species) is a distinct metric from species richness (the number of species in the community). Relative abundance is only related to species richness in that if more individuals are sampled, either because effort or catchability is greater, then the number of species observed in the sample tends to increase. The methods of Chao et al. (2014) standardize this relationship to enable comparison among different areas, while controlling for the effect, observing more species in larger samples. Rarefaction curves are considered the	Partially acceptable. Pending addition of clarifying text.

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									state-of-the-art methods in ecological literature for comparing species richness, and the methods of Chao et al. are the most current and robust methods for estimating rarefaction curves.	
167.	USEPA	6/11/16	10.7.5	Fish and Crab Community Evaluation	118	82	Page 118, Section 10.7.5 Fish and Crab Community Evaluation: This discussion should include information on mobility and home/foraging ranges. For example, it is expected that crabs are less mobile than most fish species, and crabs and other invertebrates may be more closely linked to sediments at specific locations. In contrast, most fish are expected to move within larger areas, precluding close associations with local sediments. Crab abundance and diversity can therefore be compared to sediment chemistry at specific locations, while such comparisons are less informative for most fish species (except for mummichogs). Revise this section.	Disagree	As described in the USEPA-approved Phase 2 RI Work Plan Volume 1, the fish and crab surveys were designed for a qualitative comparison with the reference areas. The surveys were not designed for a quantitative evaluation of fish or crab abundance and diversity with sediment chemistry.	Unacceptable. EPA comment does not suggest revising purpose of sampling, but asks that additional discussion on potentially useful home/foraging ranges be included.
168.	USEPA	6/11/16	11	Wildlife Risk Assessment	121	83	Page 121, Section 11 Wildlife Risk Assessment: In the current BERA evaluation, risks for piscivorous mammals were not included. In order to have consideration of wildlife consuming fish at the Newtown Creek, add fish to raccoon's diet in risk calculations.	Disagree/ Comply	As discussed in the BERA, the scientific literature indicates that urban raccoons readily forage on garbage and discarded human food waste. Studies of raccoon scat by Hoffmann and Gottschang (1977) revealed the presence of aluminum foil, cellophane wrappers, string, paper, cloth, bits of plastic, and rubber bands, indicating that the raccoons in their study were eating garbage. However, in response to USEPA's request, fish will be added to the raccoon's diet and risk calculations will be included in the uncertainty section. See also response to ID No. 179.	Acceptable
169.	USEPA	6/11/16	11.1.1.2	Habitat Surveys	123	84	Page 123, Section 11.1.1.2 Habitat Surveys, Second Paragraph, Last Sentence: The BERA does not need to compare Phase 1 and Phase 2 data. For the BERA, data from both Phases have been combined to evaluate the risk to ecological receptors.	Clarification	The comparison is needed to verify that the observation methods used for both Phase 1 and Phase 2 are similar.	Acceptable. Pending additional clarifying text.
170.	USEPA	6/11/16	11.1.2.1.1	Study Area	125	85	Page 125, Section 11.1.2.1.1 Study Area, First Incomplete Paragraph: Intertidal areas are identified in this paragraph. It would be helpful to include the estimated area of intertidal habitat present in Newtown Creek and the associated reference areas. Additionally, the name common reed and phragmites are used interchangeably in Section 11.1.2. One name should be used consistently within the document.	Agree	The estimated area of intertidal habitat present in the Study Area and the associated reference areas will be included. The term phragmites will be used in the text.	Acceptable.
171.	USEPA	6/11/16	11.1.2.2.1	Estimated Avian Diversity and Abundance	128	86a	Pages 128 and 129, Section 11.1.2.2.1 Estimated Avian Diversity and Abundance: a. Page 128: A summary table should be embedded in this section that ranks each feeding guild by waterbody for all of the parameters discussed.	Agree/ Clarification	A summary table will be included. A summary table of this type is a logical extension of the existing Section 11 tables, and therefore, it is recommended that this table be included with all of the Section 11 tables and not embedded in the Section 11 text.	Acceptable.
172.	USEPA	6/11/16	11.1.2.2.1	Estimated Avian Diversity and Abundance	129	86b	b. Page 129: An additional paragraph should be included that compares the study area to reference areas for all birds combined.	Agree	The text will be revised to include a paragraph that makes this comparison.	Acceptable
173.	USEPA	6/11/16	11.1.2.2.2	Avian Foraging Activity	129	87a	Pages 129 to 131, Section 11.1.2.2.2 Avian Foraging Activity: a. Page 129, First Paragraph: This text should clarify how these estimates are derived. Table 11-7 and	Agree	The text and table will be revised to clarify that the estimates are based on field observations.	Acceptable

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							the text below suggests that all these estimates are based on field observations of birds foraging, but confirmation is needed.			
174.	USEPA	6/11/16	11.1.2.2.2	Avian Foraging Activity	130	87b	b. Page 130, First Paragraph, Last Sentence: It states "Foraging in the Study Area likely represents only a fraction of their daily dietary requirement". This should be qualified as being based on the time of the surveys. We have no idea of foraging behavior at other times. Additionally, without using marked birds or radio telemetry it is not clear if the same birds are using small areas for foraging (i.e., using Newtown Creek exclusively), flying to feeding their young and returning or if birds are using larger areas for foraging and only visiting Newtown Creek infrequently. The only conclusion that can be made based on the observations are that double- crested cormorants forage in the study area and nest roost in other locations.	Agree/ Clarification	The NCG understands the overall level of uncertainty associated with observations of this type. However, the NCG also believes that the incremental effort spent observing double-crested cormorants generated valuable information about foraging behavior for this species and feeding guild and should be considered. Additional text will be added in support of the value of these observations, in addition to the qualifications requested in the comment.	Acceptable
175.	USEPA	6/11/16	11.1.2.2.2	Avian Foraging Activity	131	87c-i	c. Page 131: i. First Bullet: Belted kingfishers also like to use pilings, posts and other structures as perches while foraging. The lack of trees is not a limiting factor for foraging.	Comment Noted	The bullet will be revised to reflect the comment.	Acceptable
176.	USEPA	6/11/16	11.1.2.2.2	Avian Foraging Activity	131	87c-ii	ii. Second Bullet: In addition to more types of prey species, there should be mention of relative prey abundance between reference areas and the Study Area. Presence or abundance of piscivorous birds is probably influenced more by fish abundance than fish diversity. Revise this bullet. Additionally, Atlantic silversides were observed in Newtown Creek, along with grass shrimp.	Agree	The text will be revised.	Acceptable
177.	USEPA	6/11/16	11.3	Approach	132	88a	Page 132, Section 11.3 Approach: a. First Paragraph: Both NOAELs and LOAELs should be used in the BERA to bound the risk estimates.	Disagree	It is a standard approach in an ecological risk assessment to use NOAELs in the screening process to identify COPECs for the wildlife risk assessment. This effectively provides a lower bound on risk estimates. LOAELs are appropriate for the baseline risk assessment estimates. See also response to ID No. 6.	Unacceptable. EPA stands by EPA original comment.
178.	USEPA	6/11/16	11.3	Approach	132	88b	b. Bulleted Text: Clarify if the screening identified is related to the SLERA. Another term should be used, such as "baseline risk for wildlife", if the bullets are describing the results from the BERA. This is applicable throughout the document. Screening should only be used when discussing the SLERA.	Clarification	In this instance, the results refer to the screening conducted as part of the BERA. A SLERA was completed during the BERA PF development process after the Phase 1 data collection program was complete. USEPA did not want to re-issue the SLERA after the Phase 2 data collection program was complete. It directed the NCG to incorporate the Phase 2 data into the original dataset used for the SLERA and complete an updated screening that also included changes to, for example, the SL selection hierarchy. Section 5 of the BERA describes this BERA	Partially acceptable, depending on clarification of the text.

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									screening process but does not use the term SLERA. The bulleted items referred to describe the outcome of the BERA screening process for wildlife.	
179.	USEPA	6/11/16	11.4.1.2	Dietary Proportions	134	89	Page 134, Section 11.4.1.2 Dietary Proportions, Second Complete Paragraph: As identified earlier, an additional calculation needs to be included that incorporates fish into the diet (i.e., 25, 50 and 100%).	Comply	As discussed in response to ID No. 168, the scientific literature indicates that the diet of urban raccoons consists primarily of garbage and discarded human food waste. This is reflected in USEPA's *Wildlife Exposure Factors Handbook*, which indicates that fish comprise trace to 3% of the raccoon diet (USEPA 1993). However, in response to USEPA's request, and based on the literature, a sensitivity analysis will be conducted and included in the uncertainty section with up to 25% fish added to the raccoon's diet (Dorney 1954; Rulison et al. 2012).	Acceptable
180.	USEPA	6/11/16	11.4.2.1	Seasonal Exposure	135	90	Page 135, Section 11.4.2.1 Seasonal Exposure: The selection of seasonal exposure does not appear to have taken into account the avian surveys that were conducted in the creek and reference areas. Additionally, double-crested cormorants are present year-round in the New York area. The AUF should be changed to 1 for this species.	Clarification / Disagree	Seasonal exposures were based on a review of the scientific literature, not the field surveys. We do not agree that the double-crested cormorant would be foraging in the Study Area during the colder months of the year when the surface of the Study Area is frozen or close to freezing (Wires et al. 2001).	Unacceptable. EPA stands by original comment. Double-crested cormorants are resident throughout the year in NY Harbor. While the creek may be frozen for some portion of the winter, estuarine creeks in the region usually are free of ice for the majority of the winter and only have ice cover for short durations. Cormorants may alter foraging areas while ice is present, but they will return shortly after the ice is gone.
181.	USEPA	6/11/16	11.4.2.2	Site Use	137	91	Page 137, Section 11.4.2.2 Site Use: The use of exposure modifying factors can only be utilized to provide estimates of the range of possible exposure risks. Therefore, all receptors should have a calculation with the EMF equivalent to 1, with additional EMFs presented as a range such as 0.25, 0.5 and 0.75.	Disagree/ Comply	The NCG believes that the field surveys and the literature support the EMFs used in the BERA. However, the sensitivity of the risk estimates to a realistic range of EMFs around the values used in the BERA will be discussed in the uncertainty section.	Partially acceptable. A short-term field survey cannot provide useful information on the frequency and duration of site use. Given the very high uncertainties with estimating long term exposure frequency and duration, EMFs are best presented as ranges as described in the original comment. Risk estimates based on these ranges should not be limited to the Uncertainty section of the BERA.
182.	USEPA	6/11/16	11.4.2.3	Available Intertidal Habitat	137	92	Page 137, Section 11.4.2.3 Available Intertidal Habitat: Spotted sandpipers also forage for other prey that inhabit areas other than mudflats. An EMF of 1 needs to be included, and the reduced EMF can be used to bound the risk estimate. This applies for the raccoon also.	Clarification / Comply	The NCG agrees that the spotted sandpiper and the raccoon forage for prey that inhabit areas other than mudflats (i.e., riprap); however, these receptors do not ingest sediment while foraging in these areas. In addition to a seasonal adjustment to the EMF, only the sediment ingestion term was modified to account for foraging activity in areas other than mudflats. For this reason, the NCG believes the EMF used for the spotted sandpiper and raccoon are appropriate. However, the sensitivity of the risk estimates to a realistic range of EMFs around the values used in the BERA will be discussed in the uncertainty section.	Partially acceptable. See EPA response to ID No. 181.
183.	USEPA	6/11/16	11.4.3.1	Surface Water	138	93	Page 138, Section 11.4.3.1 Surface water: Add text to confirm that drinking water EPCs are based on total and not dissolved measurements.	Agree	Text will be added to clarify the use of total measurements in surface water EPCs.	Acceptable
184.	USEPA	6/11/16	11.4.3.2	Surface Sediment	138	94	Page 138, Section 11.4.3.2 Surface Sediment, Last Paragraph: Incidental ingestion of sediment for kingfishers should be discussed in the uncertainty section, since the chance for kingfishers to ingest sediment is very low. Although it may be low, as stated with other	Comply	A discussion of the 1% incidental sediment ingestion for the belted kingfisher will be included in the uncertainty section. Although the NCG believes belted kingfishers primarily forage in Maspeth Creek and areas of the Turning Basin with vegetated shoreline, the belted kingfisher diet will be	Acceptable

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							parameters, an EPC for all sediment should also be included.		revised to reflect a Study Area-wide exposure per comment ID Nos. 175 and 185.	
185.	USEPA	6/11/16	11.4.3.3	Tissue	139	95a	Page 139, Section 11.4.3.3 Tissue: a. As described for other parameters, all mummichog samples should be used as dietary items for the belted kingfisher, and this use should not be limited to Maspeth Creek.	Comply	Although the NCG believes belted kingfishers primarily forage in Maspeth Creek and areas of the Turning Basin with vegetated shoreline, the belted kingfisher diet will be revised to reflect a Study Area-wide exposure per comment ID Nos. 175 and 184.	Acceptable
186.	USEPA	6/11/16	11.4.3.3	Tissue	139	95b	b. Third paragraph: This paragraph states that predicted tissue concentrations of total PCB congeners, total PCB congener TEQs and total dioxin/furan TEQs were used. It is inappropriate to use predicated concentrations if measured concentrations are available. The measured concentrations should be the primary source for the tissue data in the baseline risk analysis. The predicated concentrations could be used as supplemental to the measured concentrations. Revise the text and tables associated with this.	Clarification	This paragraph is referring to polychaete tissue concentrations only. Polychaete tissue concentrations were measured in the bioaccumulation study for 13 locations in the Study Area, not in field-collected polychaetes (insufficient tissue mass for chemical analysis). Because wildlife are foraging throughout the intertidal area, not just at those 13 locations, the strong relationship between sediment and polychaete tissue concentrations for these COPECs allows for a confident prediction of polychaete tissue concentration. It makes sense to use the strong relationship between sediment and tissue concentrations to predict tissue concentrations using the sediment concentrations in the areas where exposure actually occurs for these receptors.	Unacceptable. EPA stands by its original comment. The measured concentrations should be the primary source for tissue data. It may be appropriate to also include predicted tissue concentrations of PCBs and dioxin/furan for comparative purposes, but it is inappropriate to use predicted concentrations if measured concentrations are available.
187.	USEPA	6/11/16	11.5	Measures of Effect	140	96	Page 140, Section 11.5 Measures of Effect: Both the NOAEL and LOAEL values should be presented. The Risk Characterization needs to be updated to reflect the comments from this section.	Disagree	See the response to ID No. 6.	Unacceptable. See response to ID No. 6.
188.	USEPA	6/11/16	11.6	Risk Characterization	140	97a	Page 140, Section 11.6 Risk Characterization: a. Second Paragraph: EPA uses a HQ of 1. All comparisons should be made utilizing this value. The value of 2.5 is above our acceptable value and represents the potential for adverse ecological impacts.	Clarification	The text in this paragraph was not written to imply that HQ = 2.5 is a threshold value. The COCs identified in this paragraph are based on HQ > 1 values. The text will be modified to clarify this.	Acceptable
189.	USEPA	6/11/16	11.6	Risk Characterization	140	97b	b. Last Paragraph: Delete the qualifying phrase "...although....". TRVs are based on LOAELs, so where dietary HQs exceed 1, there is potential for adverse effects in avian receptors associated with the elevated HQ. Conclusive statements like such should be based on the data. Revise this paragraph and present the data.	Clarification	The data will be presented and the text will be revised to reflect a weight of evidence regarding the potential for adverse effects.	Acceptable
190.	USEPA	6/11/16	11.7.1	Uncertainty with Exposure Assessment	141	98a	Page 141, Section 11.7.1 Uncertainty with Exposure Assessment: a. For many bioaccumulative contaminants, fish lipid content also affects body burden. Piscivores that consume fattier fish will be at higher risk. Species-specific variability of lipid content in collected fish should be presented and discussed.	Clarification	The risk estimates were based on chemical concentrations in fish collected from the Study Area, which therefore, represent the range of lipid content in fish to which the piscivores are exposed.	Partially acceptable. Pending additional text that describes the range of lipid concentrations in collected fish.
191.	USEPA	6/11/16	11.7.1	Uncertainty with Exposure Assessment	141	98b	b. Second Paragraph: The discussion on the size of the fish may be relevant for the belted kingfisher, but not for the double-crested cormorant, as they consume large fish in addition to small fish. Additionally, more text needs to be added to describe why lower body	Agree	The text will be revised to clarify and expand on the exposure uncertainties.	Acceptable

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							weights result in higher risks, as well as why laboratory bioaccumulation values would over or under-estimate risk. The public will be reading and commenting on this document so it needs to be clear and transparent.			
192.	USEPA	6/11/16	11.7.2	Uncertainty with Measures of Effect	141	99a	Pages 141 and 142, Section 11.7.2 Uncertainty with Measures of Effect: a. Page 141, Third Sentence: It states "However, because the lowest observed effects data are typically selected to derive the TRVs, using these TRVs likely results in an over estimation of risk." This sentence is not necessarily true. Low effects data are selected from a very small subset of taxa. Toxicity data are available for only a few of the numerous species that may be present. We have no idea of the sensitivity of all the untested taxa to contaminants, so it is just as likely that use of selected TRV results in underestimation of risk for untested species. Additionally, since LOEL data is being used, effects are being observed at those concentrations, so risk would not be over-estimated, and in fact is more likely to be under-estimated. The discussion should conclude that risks are either over- or under-estimated.	Agree	The text will be revised to clarify these uncertainties.	Acceptable
193.	USEPA	6/11/16	11.7.2	Uncertainty with Measures of Effect	142	99b	b. Page 142, First Incomplete Paragraph, Last Sentence: It states "This species is known to be more sensitive to PCBs than other species; Therefore, use of this TRV likely results in an over estimation of risk." The sentence is not necessarily true. Chickens are among the most sensitive avian species tested, but the number of birds tested for sensitivity to PCBs is a small fraction of birds that may use the site. Also, designations regarding sensitivity to PCBs are based on dioxin- like effects only. PCB exposure can result in numerous other effects that are unrelated to the Ah-receptor. Revise this text to acknowledge the information provided above.	Agree	The text will be revised to include additional details regarding the relative sensitivity of avian species to exposure to PCBs, including a discussion of exposure to dioxin-like compounds versus non-dioxin PCBs.	Acceptable
194.	USEPA	6/11/16	11.7.2	Uncertainty with Measures of Effect	142	99c	c. Uncertainty over the selection of upper-trophic level receptors should also be discussed in this section. Piscivorous mammals, such as mink, seals or otters, were not included in the risk assessment. Of the three, seals likely have the greatest opportunity for exposure in Newtown Creek for a small portion of the year, especially given that one has been spotted basking on the steps near Whale Creek. While current exposures are likely limited, in the future as populations grow in numbers, this exposure may be more frequent in the future. The uncertainty should be discussed in the document.	Agree	Additional text will be added to acknowledge this uncertainty.	Acceptable

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195.	USEPA	6/11/16	11.7.2	Uncertainty with Measures of Effect	142	99d	d. Page 142, First Paragraph: The use of the TRV for estimating risk from PCBs for avian species may over or underestimate the risk depending up on the Ah receptor in individual species. Avian species have different levels of the Ah receptor. While the surrogate species selected in the BERA may be less sensitive than the species chosen for the TRV, there may be other species using Newtown Creek that are as sensitive or more sensitive; thus, the risk could be under estimated also.	Agree	See the response to ID No. 193.	Acceptable.
196.	USEPA	6/11/16	11.7.3	Uncertain COPECs	142	100	Page 142, Section 11.7.3 Uncertain COPECs: A statement indicating that the risk is underestimated due to not including a quantitative analysis of the contaminants without TRVs needs to be included in all of the uncertainty sections for each receptor type.	Agree	To the extent that this type of language has not been included for each receptor type, text will be added to clarify this uncertainty.	Acceptable
197.	USEPA	6/11/16	12.1	Introduction	143	101	Page 143, Section 12.1 Introduction: Move the second paragraph to the beginning of the section. In addition, although were no rooted macrophytes observed, it is possible that in the future rooted macrophytes could be present in Newtown Creek if conditions change.	Agree	The second paragraph will be moved to the beginning of the section.	Acceptable
198.	USEPA	6/11/16	12.3.2	Emergent Macrophytes	145	102	Page 145, Section 12.3.2 Emergent Macrophytes, First Paragraph: Add text that describes the possible sources of sulfide.	Agree	Text will be added that describes possible sources of sulfide.	Acceptable
199.	USEPA	6/11/16	13.3.2	Reptiles	148	103a	Page 148, Section 13.3.2 Reptiles: a. Add an additional discussion to this section that describes the possibility for the four species of sea turtles that could be very infrequent visitors to Newtown Creek. The point of this is to acknowledge that sea turtles may have access to the creek, but that they would be infrequent visitors and have limited exposure.	Agree	Text will be added to include a brief discussion on the potential for sea turtles to access the Study Area and that the potential for exposures are very low.	Acceptable
200.	USEPA	6/11/16	13.3.2	Reptiles	148	103b	b. First Paragraph, First Sentence: It states "… reptiles such as turtles or terrapins…". Terrapins are turtles, so this is redundant. Either delete "terrapins" or use the term "marine or sea turtles" if you are identifying marine turtles specifically.	Agree	The text will be edited to clarify the description. "Terrapins" will be deleted.	Acceptable
201.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	150 to 155	104a	Pages 150 to 155, Section 14 Baseline Ecological Risk Assessment Summary: a. The entire summary will need to be revised to reflect comments provided by EPA.	Comment Noted	Portions of the summary will be revised as described below.	Acceptable
202.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	151	104b	b. Page 151, First Complete Paragraph: Change "maximum and Study Area-wide 95% UCL exposure concentrations" to "maximum or Study-Area-wide 95% UCL exposure concentrations" in various sentences in this paragraph.	Agree	Text in the second paragraph will be revised.	Acceptable
203.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment	151	104c	c. Page 151, Second Paragraph: As mentioned in other comments, the term screening should only	Clarification	Screening is only used when describing components of the SLERA.	Acceptable. Pending addition of clarifying text.

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				Summary			be used to describe components of the SLERA.			
204.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	151	104d-i	d. Page 151, Last Paragraph: i. Discussion in this paragraph appears biased to minimize risks. Use of terms such as "only" should be eliminated. Further, any HQ over 1 indicates unacceptable risk. There is no linear relationship with magnitude of HQ and severity of adverse effect. Revise this paragraph.	Clarification	See the response to ID Nos. 164 and 165.	Unacceptable. EPA stands by EPA original comment.
205.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	151	104d-ii	ii. Each line of evidence should be interpreted independently. If porewater shows risk, and surface water or tissue does not show risk, it is inappropriate to minimize the porewater risk.	Clarification	See the response to ID Nos. 164 and 165.	Unacceptable. EPA original comment stands.
206.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	152	104e-i	e. Page 152: i. Top Incomplete Paragraph: This is an inappropriate conclusion. See previous comment regarding independent lines of evidence. This applies to all contaminants, including PAHs.	Clarification	See the response to ID Nos. 164 and 165.	Unacceptable. EPA original comment stands.
207.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	152	104e-ii	ii. Second Paragraph: Delete "only" in this discussion. Lead and PCB exposures indicate unacceptable risk (HQs>1).	Clarification	See the response to ID Nos. 164 and 165.	Unacceptable. EPA original comment stands.
208.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	152	104e-iii	iii. Third Paragraph, Last Sentence: Delete "incremental" and replace with "unacceptable".	Agree	Assuming this comment is referring to the first sentence of the third paragraph, the word "incremental" will be replaced with "unacceptable."	Acceptable
209.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	154	104f	f. Page 154, First Bullet: "Negligible" should not be used in the summary. Comparisons should be made to an HQ of 1.	Clarification	The word "negligible" will not be used. The bullet will be revised.	Acceptable
210.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	155	104g-i	g. Page 155: i. First Bullet: List the SEM metals that contributed to the toxicity.	Disagree	Such details are not necessary for summary bullets in a conclusion.	Unacceptable. EPA stands by its original comment.
211.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	155	104g-ii	ii. Third bullet: This bullet should be deleted as it may not be true.	Disagree	The bullet will be revised.	Partially acceptable. Pending the revision of the text.
212.	USEPA	6/11/16	14	Baseline Ecological Risk Assessment Summary	155	104g-iii	iii. Fourth Bullet: Delete this bullet. The graphs provided do not support this conclusion. There are only a few results below 3 mg/L and they are not distinguishable from those samples collected with DO above 3 mg/L.	Disagree	The data in the BERA support the statement.	Unacceptable.
213.	USEPA	6/11/16	Newtown Creek Ecological Data Quality Objectives, Data Needs, Assessment and Measurement Endpoints, and	Table 3-1	--	105	Table 3-1 Newtown Creek Ecological Data Quality Objectives, Data Needs, Assessment and Measurement Endpoints, and Risk Questions for the Baseline Ecological Risk Assessment: Measurement endpoints for bivalves should be contaminant concentrations in surface water and sediment. Representative receptor for fish should change from Spot to White Perch.	Disagree	The representative receptor for bivalves is mussels. Mussels filter particulates from surface water as their energy source. They have little if any exposure to bedded sediment. In the absence of spot, white perch were not used as a substitute species. Striped bass, mummichog, and Atlantic menhaden were used to evaluate risks to fish as a receptor and as input to the diets of wildlife receptors.	Unacceptable. See EPA response to ID No. 89 regarding bivalves. See also EPA response to ID No. 242. White Perch need to be evaluated in place of Spot. See response to ID No. 158.

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			Risk Questions for the Baseline Ecological Risk Assessment							
214.	USEPA	6/11/16	Surface Water Dataset Summary	Table 4-2	--	106	Table 4-2 Surface Water Dataset Summary: Add a footnote to the table explaining differences between the "Location Count" on this table and "stations" in the text (page 19).	Agree	The requested footnote will be added.	Acceptable
215.	USEPA	6/11/16	Surface Sediment Dataset Summary	Table 4-3	--	107	Table 4-3 Surface Sediment Dataset Summary: Add sediment depth to "Greenpoint Energy Center Sediment 2010".	Agree	A footnote that specifies the depth intervals will be added to the table.	Acceptable
216.	USEPA	6/11/16	Phase 2 Surface Sediment Dataset Summary	Tables 5-1 and 5-2	--	108	Tables 5-1 and 5-2 Phase 2 Surface Water and Sediment Screening Levels: The title the table should clearly state whether these are SLERA screening values or BERA comparison values.	Agree	The title will be updated.	Acceptable, provided the NYSDEC surface water screening values for Total DDx and the sum of Aldrin/dieldrin are included in Table 5-1, and appropriate revisions are made to the text. Table 5-1 currently does not list a NYSDEC value for Total DDx, and instead uses the NRWQC value, which is two orders of magnitude higher than the NYSDEC SD water quality standard. Table 5-1 currently does not list a NYSDEC value for the sum of Aldrin/dieldrin, which is more sensitive than the individual Aldrin and dieldrin values from the EPA Regioin 3 BTAG benchmarks currently in the table.
217.	USEPA	6/11/16	Phase 2 Fish Screening Levels, Second Column	Tables 5-3a and 5-3b	--	109	Table 5-3a Phase 2 Fish Screening Levels, Second Column: The title of the column indicating chemical name should be changed from "Metals" to "Chemicals". This comment also applies to Table 5-3b. Also, references need to be provided for the values that were selected.	Agree	The column name will be changed to "Chemicals." References will be added.	Acceptable
218.	USEPA	6/11/16	Wildlife Exposure Equations and Parameters	Table 5-4	--	110	Table 5-4 Wildlife Exposure Equations and Parameters, Page 2 of 2, Column entitled SLERA Dietary Proportions (%)[o]: The footnote "o" states that the diet proportions were based on the BERA PF. If the source for the dietary proportions in the BERA PF is Table 4-1 of the SLERA Technical Memorandum No. 1, then there are discrepancies between Table 5-4 of the draft BERA and Table 4-1 of the SLERA. For example, Table 4-1 listed 100% benthic/epibenthic invertebrates for heron; while Table 5-4 listed 50% fish, 25% blue crabs and 25% polychaetes for green heron and black-crowned night heron. However, if the source is not Table 4-1, then direct readers/reviewers to the source, specifically table(s) in the BERA PF. The title of the table needs to clearly state whether these are for the SLERA or the BERA.	Agree	Table and footnote cross-references will be updated, and any discrepancies will be corrected.	Acceptable
219.	USEPA	6/11/16	Biota Screening Tables	Tables 5-6 to 5-18	--	111a	Tables 5-6 to 5-18 Biota Screening Tables: a. The titles of the tables need to clearly state whether the tables are for the SLERA or BERA.	Agree	The titles will be updated.	Acceptable
220.	USEPA	6/11/16	Biota	Tables 5-6 to 5-18	--	111b	b. Summary tables with columns for compound	Agree/	Additional tables summarizing the outcome of the risk	Acceptable

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			Screening Tables				name, SLERA with max, SLERA with 95% UCL and BERA should be provided to show which compounds were identified within each stage. mpound — SLERA with Maximum — SLERA with 95% UCL — BERA NOAEL — B LC A — X — X — X — B — X — X — X — C — X — X — — D — X — — —	Clarification	screening (SLERA) will be provided in Section 5. See also response to ID No. 2 for an explanation of the screening analyses (SLERA) versus the baseline risk analyses (BERA).	
221.	USEPA	6/11/16	Biota Screening Tables	Tables 5-6 to 5-18	--	111c	c. The EPC used to compare with the SL should be the lower value of the maximum detected concentration and 95% UCL. Under the column heading "Rationale for COPEC Flag" in many of these tables, it listed "Max Conc < SL" for several chemicals, but for these chemicals EPC should be 95% UCL values and not maximum concentrations, since 95% UCLs are lower than the maximum concentrations. Review these tables and make necessary changes.	Clarification	The screening process starts with a comparison of the maximum concentration to the SL. If this concentration exceeds the EPC and the FoD is greater than 5%, then the 95% UCL is compared to the EPC. The tables may reflect chemicals being screened in or out based on various outcomes of this screening process, consistent with Figures 5-1 and 5-2. The NCG believes it makes sense to have the information and the results in the tables reflect this USEPA-approved screening process.	Acceptable. Pending addition of clarifying text/table.
222.	USEPA	6/11/16	Biota Screening Tables	Tables 5-6 to 5-18	--	111d	d. These screen tables need to add a column to the right of the Screening Level column entitled "HQ". It would be much easier for readers/reviewers to follow the results of COPEC flag, rather than to check 95% UCL, maximum concentration, SL.	Disagree	HQs are not needed in these tables because the purpose of the SLERA is to identify COPECs for further evaluation in the baseline risk assessments, regardless of the magnitude of the HQ.	Unacceptable. It is standard practice to reveal screening level HQs at the SLERA stage.
223.	USEPA	6/11/16	Biota Screening Tables	Tables 5-6 to 5-18	--	111e	e. It was noted that 95% UCLs were not calculated for many chemicals, specifically for those chemicals do not have SLs in these tables. However, 95% UCL was present for few chemicals which also do not have SLs. Explain this inconsistency.	Agree	Tables will be reviewed and updated as necessary.	Acceptable
224.	USEPA	6/11/16	Biota Screening Tables	Tables 5-6 to 5-18	--	111f	f. A footnote for differences between two columns entitled "Maximum Detected Concentration" and "Maximum Concentration" is needed for all of these screening tables.	Agree	The requested footnote will be added.	Acceptable
225.	USEPA	6/11/16	Biota Screening Tables	Table 5-10	--	111g	g. Table 5-10 Blue Crab Screen: Copper was eliminated as a COPEC, and rationale for COPEC Flag was listed "95% UCL = SL". However, the 95% UCL for copper was 19 mg/kg and SL was 18.5 mg/kg and 19 is not equal to 18.5. Copper should be retained as a COPEC in blue crab.	Disagree	The NCG does not believe that copper should be retained as a COPEC in blue crab. The 95% UCLs in Table 5-10 are rounded to two significant figures for presentation purposes. The 95% UCL for copper is actually 18.88 mg/kg (see BERA Attachment A12, blue crab ProUCL output files), resulting in an HQ of 1.02, which when rounded, becomes equal to 1.	Unacceptable. Presenting HQs with 2 significant figures is acceptable, but HQs exceeding one prior to any rounding should be viewed as unacceptable and chemicals with HQs>1 should be retained for further investigation.
226.	USEPA	6/11/16	Phase 2 Baseline Surface Water Chronic Threshold Values	Table 6-1	--	112	Table 6-1 Phase 2 Baseline Surface Water Chronic Threshold Values: The BERA uses Phase I and Phase II data combined and it is not clear why this table is only using Phase II data.	Clarification	This table is only referring to the threshold values, not the exposure data. The BERA uses both Phase 1 and Phase 2 data. The title will be revised.	Acceptable. Pending addition of clarifying text.
227.	USEPA	6/11/16	Benthic Community	Table 8-2	--	113	Table 8-2 Benthic Community Dominance Summary: Confirm that Leitoscoloplos robustus is "Not Pollution	Clarification	Confirmed. Adams et al. (1998) does not classify *Leitoscoloplos robustus* as either Pollution Indicating or	Acceptable. Add text and reference.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
			Dominance Summary				Indicating or Sensitive". In addition, italicize scientific names in this table.		Sensitive.	
228.	USEPA	6/11/16	Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2012 – Lowest WBI – All Reference Stations; Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2014 – Lowest WBI – All Reference Stations	Tables 8-3a and 8-3b	--	114	Table 8-3a Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2012 – Lowest WBI – All Reference Stations: Title of this table as well as Table 8-3b, needs to be revised for clarity. The title reads "Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2012 – Lowest WBI – All Reference Stations". It is not clear to readers/reviewers what "-Lowest WBI – All Reference Stations" meant, since there were no 2012 data from the reference areas (Table 8-3a) and there are data listed for any reference areas (Table 8-3b). In addition, EPA received the following three comments from NYCDEP related to this table series. EPA agrees that these comments should be addressed, see details below. Table 8-3a Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2012 – Lowest WBI – All Reference Stations and Table 8-3b Benthic Community Reference Threshold and Dissolved Oxygen Evaluation for 2014 – Lowest WBI – All Reference Stations: The Weisberg Index does not discriminate among sites that have index scores less than three. That is, the Weisberg index does not consider that a site with a score of 2 is more stressed than a site with an index of 3 or less stressed than an index of 1. All of the stations presented in this Figure have a WBI < 3. These communities are all equivalent, based on the Weisberg Index. That is, they are all stressed. The BERA should not be trying to reclassify some of these stressed stations as if the Weisberg Index permits various levels of stress. It does not do so. In any event, this is another case in which the BERA is trying to tie an observation (in this case an unsupported reference envelope for the Weisberg Index) which again depend on which data are selected to a confounding factor; ignoring once again CERCLA-related contaminants. In this table, there are a number of examples in which the DO concentration is less than 3 mg/L, but the WBI is greater than the reference envelope value. The Tables also illustrate the seasonal patterns in DO levels (but does not illustrate within season variability). As is the case throughout, the tables ignore CERCLA-related stressors in favor of emphasizing confounding factors. Delete these tables because they misrepresent and improperly apply the Weisberg Index to evaluate the claimed influence of a confounding factor instead of evaluating CERCLA contaminants.	Objection/ Disagree	Footnotes will be added to Tables 8-3a and 8-3b to clarify that Study Area benthic community data collected in both 2012 and 2014 were compared to the lowest WBI score in the 2014 reference area data. The NCG disagrees that the WBI cannot discriminate between WBI scores that are between 1 and 3. In Adams et al. (1998), Table 6-4 (Percent of Area within B-IBI Categories), sites within NY-NJ Harbor are given three WBI classifications: • 1 to <2 impacted • 2 to 3 moderately impacted • 3 to 5 un-impacted This same classification system was used in USEPA (2003) to classify the WBI in the updated evaluation of the NY-NJ Harbor system. These descriptions can be added to Figures 8-7 to 8-10b to support the discussion on the relationships between COPECs and WBI. A comparison of the Study Area in 2012 to the Study Area in 2014, for both spring and summer, will be added to make the point that there are within the Study Area differences observed for the benthic community that are related to decreases in DO. The NCG disagrees that the tables misrepresent and improperly apply the WBI. The tables clearly show the relationship between a WBI reference threshold above/below 1.1 and the DO threshold of above/below 3 mg/L, and therefore, will be retained.	Partially acceptable. The DO concerns can be included in the Uncertainty section. Additional information and discussion should be included to compare the results to the WBI classification in NCG response (1 to <2, 2 to 3, and 3 to 5). The current document only uses 5, 3, and 1. It is also advisable to use a mean value for each of the individual reference areas as the comparison point instead of the lowest WBI value.
229.	USEPA	6/11/16	WBI and Metric	Table 8-3c	--	115	Table 8-3c WBI and Metric Comparisons – Study Area versus Reference Areas: See Specific Comment No. 57	Clarification	See the response to ID Nos. 111 to 116.	Unacceptable. See EPA responses to ID Nos. 114, 115, and 116.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
			Comparisons – Study Area versus Reference Areas				made on pages 68 to 70, Section 8.3.2.5 Benthic Community Stressors.			
230.	USEPA	6/11/16	WBI and Metric Comparisons – Study Area versus Reference Areas	Table 8-3c	--	116	Table 8-3c WBI and Metric Comparisons – Study Area versus Reference Areas: The Weisberg Index does not discriminate among sites that have index scores less than three. That is, the Weisberg index does not consider that a site with a score of 2 is more stressed than a site with an index of 3 or less stressed than an index of 1. All of the stations presented in this Figure have a WBI < 3. These communities are all the same based on the Weisberg Index. That is, they are all stressed. The BERA should not be trying to reclassify some of these stressed stations as if the Weisberg Index permits various levels of stress. It does not do so. Delete this table because it misrepresents and improperly applies the Weisberg Index in statistical comparisons.	Disagree	See response to ID No. 228.	See response to ID No. 228.
231.	USEPA	6/11/16	Study Area Porewater Toxic Unit Calculations; Reference Area Porewater Toxic Unit Calculations; and Baseline Ecological Risk Assessment Summary	Tables 8-4a, 8-4b, and 14-1	--	117	Table 8-4a Study Area Porewater Toxic Unit Calculations, Table 8-4b Reference Area Porewater Toxic Unit Calculations, and Table 14-1 Baseline Ecological Risk Assessment Summary: The BERA argues convincingly that SEM metals are not available based on the AVS-SEM analyses. The weight of evidence in the BERA clearly dismisses the bioavailability of SEM metals based on three lines of evidence: the AVS-SEM analysis, the low concentrations of metals in pore water, and the extraction analyses performed within the BERA. These tables (and the BERA) should not be re- introducing metals as a COPEC in the form of SEM metals. The BERA and these tables provide the calculation of an unsupported concept: an SEM toxic unit approach. The BERA fails to support the development of an SEM TU approach which incorrectly assumes additivity given the various and very different mechanisms of action for metal toxicity, the various and different target organs associated with metal toxicity, and the complex biogeochemical properties of metals. See full response to SEM TUs in comment for Figures 8-19a through 8-24a. There appears to be no support in the scientific literature for the development of application of SEM TUs, and the BERA should drop this unsupported analysis from consideration. Also, the work plan identifies 17 PAHs as the COPECs in sediment. The BERA and this Table employs 34 PAHs in the development of PAH toxicity units. This is an issue that should be addressed in an uncertainty section. Delete all SEM Metals and the SEM Metal TU from these tables – the metals are not available and the method is	Disagree	The reviewer is referred to USEPA guidance for clarification on the correct treatment of metals (USEPA 2005b) and PAHs (USEPA 2003; Burgess 2009) in sediment risk assessments. Direct measurement of metals in porewater during the toxicity tests demonstrates that copper and zinc were bioavailable. In USEPA (2005b) EqP document for metals—*Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc)*—the use of a sum of the SEM is fully documented. As correctly detailed in the draft BERA report, the use of the SEM toxic unit is a conservative exposure assumption and is consistent with USEPA risk assessment guidance. Although we agree that metals biogeochemistry is complex, direct measurement of porewater allows for a high degree of confidence that, in some samples, metals were bioavailable. The use of PAH (34) is consistent with USEPA guidance for evaluating risk to benthic PAHs in sediment (USEPA 2003; Burgess 2009). There is no reason to revise the draft BERA report in this regard. The use of PAH (17) is not recommended by USEPA (2003) unless a correction is introduced to normalize the result to an equivalent PAH (34) concentration. The use of a correction factor introduces a significant level of uncertainty, which can be avoided in this instance because PAH (34) has been measured empirically. Developing a relationship between PAH (34) porewater concentrations and PAH (17) concentrations for purposes of developing PRGs can be accomplished during the FS process.	Partially acceptable, depending on clarification of the text.

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							unsupported. Revise the PAH TU to focus only on the 17 PAHs in the workplan and provide a discussion of the full 34 PAHs in the uncertainty section.			
232.	USEPA	6/11/16	Porewater Chronic Threshold Values	Table 8-4c	--	118	Table 8-4c Porewater Chronic Threshold Values: Note in earlier comments, the source for NYSDEC values listed in this table are outdated. Revise table using the updated NYSDEC values.	Agree	Values will be updated as appropriate.	Acceptable
233.	USEPA	6/11/16	Sediment Bioassay Reference Envelop Evaluation Using Lower 95% Confidence Interval of 5th Percentile	Table 8-7	--	119	Table 8-7 Sediment Bioassay Reference Envelop Evaluation Using Lower 95% Confidence Interval of 5th Percentile: This table presents control-adjusted toxicity endpoints. For greater clarity, toxicity test results should be presented for the control sites and Newtown Creek site separately. The reference envelope approach used in the BERA is overly complex and uses a very low (5th) percentile of reference area toxicity data. The toxicity data should be presented more simply, comparing data from the laboratory controls, Newtown Creek sites and each reference area individually. In addition, it is recognized that no single value can be identified as the best "percentile" to serve as a criterion for reference data or conditions for comparison to site data. A range of values may help interpret these comparisons. For example, use of the 5th percentile as a reference criterion, as presented in EPA guidance for conducting Rapid Bioassessment Protocols (RBP; EPA 841-B-99-002), can be supplemented by use of a higher value, such as the 20th percentile. As discussed in RBP guidance (EPA 841-B-99-002), increasing the percentile of reference area data as a criterion for comparison to site data increases the accuracy of correctly identifying impaired or stressed sites, but decreases the accuracy of correctly identifying unimpaired sites. Using two different percentiles as reference criteria (e.g., 5th and 20th percentiles) therefore allows for a more comprehensive interpretation of comparisons. In addition, EPA received the following comment from NYCDEP related to this table. EPA agrees that this comment should be addressed, see details below: Table 8-7 Sediment Bioassay Reference Envelope Evaluation Using Lower 95% Confidence Interval of 5th Percentile: Because there are no specific guidelines on control growth and reproduction in sediment toxicity tests, control adjusting these results is not appropriate. Revise this Table to present non- adjusted growth and reproduction results.	Clarification / Disagree	The reference area data are the basis of the reference envelope calculation. Control data are used to establish test QA/QC, to normalize between batches, and to assess the statistical difference from the control treatment. Establishing the statistical differences between reference and test stations and control stations was done using ANOVA. The pooled variance allows the random variability of the test (e.g., the noise of the test) to be incorporated using an established multiple comparison test. The reference area data are integral to the presentation in Table 8-7. We agree that additional tables of reference area and Study Area data would be helpful for more transparently conveying the test data. The reference envelope approach provides a quantitative estimate of percentile that one is 95% certain that the reference envelope value is not lower than that percentile lower bound. In fact, it is no more complex than the 95% UCL calculation used to estimate exposure point concentrations available in ProUCL. Also see the response to ID Nos. 3 and 12.	Unacceptable. EPA agrees with the laboratory control response. EPA also agrees that additional tables and text are warranted. However, the reference area locations must also be addressed separately. See EPA responses to ID No. 3, 12. The BERA should also include statistical justification for control adjusting bioassay results for the growth and reproduction endpoints.
234.	USEPA	6/11/16	Correlation Coefficients for Bulk Sediment and	Tables 8-8a and 8-8b	--	120	Table 8-8a Correlation Coefficients for Bulk Sediment and Leptocheirus Survival and Table 8-8b Correlation Probability Values for Bulk Sediment and Leptocheirus Survival: Explain why the correlation coefficient is one (1)	Agree/ Clarification	The p-value of <0.0001 is an artifact of the software computation and is essentially the same as zero. The probabilities in Table 8-8b for pairs with an r value = 1 (the diagonal line of matching pairs) will be removed.	Acceptable.

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			Leptocheirus Survival; Correlation Probability Values for Bulk Sediment and Leptocheirus Survival				on Table 8-8a, and the corresponding probability value on Table 8-8b is "<0.0001". If correlation coefficient is one, there should not be a value for probability.			
235.	USEPA	6/11/16	Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations	Table 8-9	--	121	Table 8-9 Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations: EPA received the following comment from NYCDEP. EPA agrees that this comment should be addressed; Provide clear description of this table in the text. Table 8-9 Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations: Removing stations based on claims of confounding factors is misleading and unsupported by the data set, which is arbitrary and biased because only a limited number of sample locations were included in the C19-C36 analysis shown by Anchor as described by the City in multiple comments in the primary submittal. Confounding factors assessments do not belong in the main BERA analyses, but rather belong in the uncertainty section. Delete the portion of these tables with 'confounding factor stations removed' because this is unsupported by the data.	Objection/ Disagree	See the response to ID No. 139.	Unacceptable. The "confounding factor" discussion should be moved to the Uncertainty section. See response to ID No. 139.
236.	USEPA	6/11/16	Phase 2 Baseline Fish Thresholds	Table 10-1	--	122	Table 10-1 Phase 2 Baseline Fish Thresholds: References need to be provided for the selected values.	Agree	The table will be revised to include the references for the toxicity thresholds included in the table.	Acceptable
237.	USEPA	6/11/16	Fish and Crab Community Survey – Species and Abundance	Table 10-11	--	123	Table 10-11 Fish and Crab Community Survey – Species and Abundance: Add a footnote that describes the size distribution for striped bass, broken into 12 inch brackets.	Agree	The requested information will be provided, although it may make sense to provide the requested data in a separate table.	Acceptable
238.	USEPA	6/11/16	Number of Birds Observed and Number Observed Foraging by Target Feeding Guild by Location in Study Area and Reference Areas	Table 11-3	--	124	Table 11-3 Number of Birds Observed and Number Observed Foraging by Target Feeding Guild by Location in Study Area and Reference Areas: The footnote indicates that some species of piscivorus birds are not included in the feeding guild. However, the species listed in the footnote do not appear in other evaluations. Given that the species in the footnote were observed, they need to be included in the evaluation. They should be added to this table or a separate table should be included as well as text indicating the difference in feeding strategy and how that would relate to risk.	Clarification	Tables 11-2, 11-3, and 11-6 will be updated to reflect the inclusion of other birds observed in the piscivorous feeding guild. However, note the information in these tables is used to support the qualitative comparison of avian abundance and diversity between the Study Area with the reference areas, not the quantitative risk estimates.	Acceptable
239.	USEPA	6/11/16	Study Area Wildlife Exposure Modifying Factors	Table 11-9c	--	125	Table 11-9c Study Area Wildlife Exposure Modifying Factors: A seasonal exposure of 1 should be used for each receptor to provide a bounding estimate of the exposure. Double-crested cormorants are year round residents in the NY Harbor area and other species may increase their	Disagree/ Comply	See the response to ID Nos. 180 to 182.	Partially acceptable. See responses to ID Nos 180 – 182.

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							range as global temperatures increase.			
240.	USEPA	6/11/16	Baseline Ecological Risk Assessment Summary	Table 14-1	--	126	Table 14-1 Baseline Ecological Risk Assessment Summary: Need to update this table based on comments provided by EPA.	Comply	The table will be updated where applicable.	Acceptable
241.	USEPA	6/11/16	--	Figures	--	127	In addition to Study Area location map, a site map or maps showing PRP properties and all point sources on the Newtown Creek should be presented in the report.	Agree	Additional maps will be included showing the requested features and additional features where appropriate.	Acceptable
242.	USEPA	6/11/16	Ecological Exposure Pathways and Receptors	Figure 3-1	--	128	Figure 3-1 Ecological Exposure Pathways and Receptors: Add another circle type to the graphic, a half-filled circle, to represent a complete, qualitative assessment. A solid circle would be complete, quantitative and an open circle would be complete, insignificant. The following receptors would have the half-filled circles; surface water ingestion (bivalves, benthic invertebrates, epibenthic invertebrates), sediment ingestion (bivalves, fish top level predatory), sediment direct contact (bivalves). In addition, ebullition should be identified in parentheses for upland spills and releases, deep sediment sink under primary sources and between sediment (deep) and porewater under secondary sources.	Agree	A half-filled circle, to represent a complete, qualitative assessment, will be added for the appropriate receptors.	Acceptable
243.	USEPA	6/11/16	Sediment Bioassay and Bioaccumulation Study Design	Figure 4-6	--	129	Figure 4-6 Sediment Bioassay and Bioaccumulation Study Design: Spell out all acronyms on the figure under the legend. In addition, explain the differences among different colors for boxes (i.e., dark and light blue, green).	Agree	The requested clarifications will be included.	Acceptable
244.	USEPA	6/11/16	Surface Water and Sediment, Tissue, and Wildlife Screening Process	Figures 5-1 to 5-3	--	130	Figure 5-1 to 5-3 Surface Water and Sediment, Tissue, and Wildlife Screening Process: The title needs to clearly state if this flowchart is for the SLERA or BERA.	Agree	The figure titles will be updated to provide the requested clarification.	Acceptable
245.	USEPA	6/11/16	Study Area Intertidal Sediment Stations	Figure 5-4	--	131	Figure 5-4 Study Area Intertidal Sediment Stations: Add a footnote that indicates the % of shoreline area that is identified as intertidal area.	Agree	The requested footnote will be added.	Acceptable
246.	USEPA	6/11/16	Spatial Distribution and Water Column Chemical Spatial	Figures 5-5a to 6-5	--	132	Figures 5-5a to 6-5 Spatial Distribution and Water Column Chemical Spatial: Add benchmark reference lines on the graphs to show SLERA screening values and BERA comparison values.	Agree	The requested benchmark reference lines will be added.	Acceptable
247.	USEPA	6/11/16	Spatial Distribution of Aluminum in Surface Sediment	Figure 5-5b	--	133	Figure 5-5b Spatial Distribution of Aluminum in Surface Sediment: Figure for contaminants in surface sediment should follow the same mapping methodology as used in the modeling process. In addition, the major contaminants, such as copper, PCB, PAH, should also be presented similar to surface water.	Disagree	Figure 5-5b is paired with Figure 5-5a showing the spatial distribution of aluminum in surface water. The purpose of these paired figures is to illustrate why it is not necessary to include aluminum as a COPEC for further evaluation in the BERA. Unlike copper, PCBs, and PAHs, aluminum is not identified as a sediment COPEC, and concentrations are indistinguishable from reference area concentrations.	Partially acceptable. Pending additional clarifying text.
248.	USEPA	6/11/16	Comparison	Figures 8-2, 8-3,	--	134	Figures 8-2, 8-3, 8-6 Comparison with Reference Areas	Agree	The figures can be clarified that they represent benthic	Acceptable

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			with Reference Areas Richness and Abundance	and 8-6			Richness and Abundance: Add information to the title that reflects what receptor group is being depicted on the figure (e.g., worms, fish, bird).		community data.	
249.	USEPA	6/11/16	Various	Figures 5-1, 6-2, 6-3, 6-5, 8-7 to 8-9, and most figures in Section 8	--	135	Figures 5-1, 6-2, 6-3, 6-5, and most figures in Section 8: Add definition of open circles to figure legend, also yellow circles on Figures 8-7 to 8-9.	Agree	The symbols will be clarified.	Acceptable
250.	USEPA	6/11/16	Relationship of Weisberg Biotic Index with Dissolved Oxygen	Figure 8-10a to 8-10b	--	136	Figure 8-10a to 8-10b Relationship of Weisberg Biotic Index with Dissolved Oxygen: Add a reference line of 3 mg/L for the DO criterion. Note that the range of WBI values for samples with DO less 3 mg/l is 0-2 and the range of WBI values for samples with DO greater than 3 mg/l is 0- 2.9, with much overlap between values of 1 and 2. This does not show that DO is a major confounding factor in the WBI values.	Comply/ Disagree	A reference line for DO at 3.0 mg/L will be added. Although there may be overlap in scores between the sites in the less than 3.0 mg/L and greater than 3.0 mg/L groups, the number of sites with no taxa in the less than 3.0 mg/L group is important. DO is a confounding factor because occurrences of no taxa are directly related to low DO in the Study Area. Text in the BERA will be revised.	Partially Acceptable. Discussions of DO as a confounding factor should be presented in the Uncertainty section.
251.	USEPA	6/11/16	Bottom Dissolved Oxygen – Newtown Creek NYCDEP Data	Figure 8-11	--	137	Figure 8-11 Bottom Dissolved oxygen – Newtown Creek NYCDEP Data: Revise this figure. This figure misrepresents site conditions in showing only selected data (i.e., just DO concentration without benthic community data) and by presenting data for the Creek pre-aeration. Revision to display all data capturing current conditions (past aeration) only.	Objection/ Clarification	This figure does not misrepresent site conditions. The purpose of this figure is to simply illustrate seasonal and annual trends in Study Area DO using NYCDEP data that have been collected monthly over several years, not the relationship between DO and benthic community data. Because these data have been collected monthly from 2011 to 2015, they capture pre- and post-aeration conditions. There was no intent to only include pre-aeration data. We can update the figure to include DO measured during the benthic community monitoring events in 2012 and 2014 and DO data collected during surface water sample events in 2012 and 2014. The NYCDEP and Study Area data will overlap.	Acceptable
252.	USEPA	6/11/16	Dissolved Oxygen in Tributaries – Phases 1 and 2	Figure 8-12	--	138	Figure 8-12 Dissolved Oxygen in Tributaries – Phases 1 and 2: Delete this figure. This figure also misrepresents site conditions in showing only selected data such as just DO without benthic community data, and data only from three tributaries.	Objection/ Clarification	This figure does not misrepresent site conditions. The purpose of these figures is to illustrate the spatial distribution in DO conditions as monitored. The relationship between these data and benthic community is captured in Figure 8-10. For completeness, a figure for Maspeth Creek will be included in the revised BERA.	Acceptable
253.	USEPA	6/11/16	28-day Survival Reference Envelope Comparison by Study Area Creek Mile	Figure 8-13	--	139	Figure 8-13 28-day Survival Reference Envelope Comparison by Study Area Creek Mile: This figure is incomplete, misrepresents the sources and only presents an oversimplified account of the available data. The figure fails to present major sources of CERCLA contaminants including 2 National Grid Manufactured Gas Plant (MGP) sites, a 30 million gallon Exxon oil spill, several additional BP, Chevron, and Exxon oil refineries and transfer and storage facilities, a Phelps Dodge Refining Corporation (PDRC) copper smelter, and illegal midnight oil releases (e.g., Dutch Kills, summer 2015). Also, NAPL locations are not mapped. The diameter of the CSOs implies significance to these arbitrary categorizations, provides no insight into the potential influence, are arbitrary, and are not even discussed. No other outfalls are presented	Objection/ Disagree	The NCG disagrees with the premise that “this figure is incomplete, misrepresents the sources and only presents an oversimplified account of the available data.” However, the NCG will remove the CSO symbols from Figure 8-13 and Figures 8-14 through 8-18.	Partially acceptable. Pending revisions to the figure. The figure should include all contaminant sources or none. Inclusion of a subset of contaminant sources is inappropriate.

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							nor are their sizes. Also, the green triangles, while identifying stations with survival greater than the reference envelope, ignore the fact that survival in some of these stations is significantly different than controls as well. The BERA also fails to present the actual percent survival on maps for both the study area and reference areas. Revise this figure to add all sources of CERCLA contaminants, including all outfalls, remove CSO diameters, and add a laboratory control qualification to the green triangle key. Add companion figures that present the actual percent survival at all stations including reference area stations.			
254.	USEPA	6/11/16	28-day Growth (Biomass) Reference Envelope Comparison by Study Area Creek Mile; 28-day Growth (Weight) Reference Envelope Comparison by Study Area Creek Mile; 28-day Reproduction (Per Surviving Amphipod) Reference Envelope Comparison by Study Area Creek Mile; 28-day Reproduction (Per Surviving Female) Reference Envelope Comparison by Study Area Creek Mile; 10-day Survival Reference Envelope Comparison by Study Area Creek Mile	Figures 8-14 to 8-18	--	140	Figure 8-14 to 8-18: The reference envelope values may change once reference data is screened against acceptability criteria. In addition, EPA received the following comments on figures from NYCDEP. EPA agrees that these comments should be addressed, see details below: Figure 8-14 28-day Growth (Biomass) Reference Envelope Comparison by Study Area Creek Mile and Figure 8-15 28-day Growth (Weight) Reference Envelope Comparison by Study Area Creek Mile: These figures are incomplete, misrepresent the sources and only present an oversimplified account of the available data. The figures fail to present major sources of CERCLA contaminants. See Comment for Figure 8-13 above. Revise these figures to add all sources of CERCLA contaminants, remove CSO diameters, add a laboratory control qualification to the green triangle key, and utilize the measured values rather than the control-normalized values when displaying results. Add companion figures that present the actual growth at all stations including reference area stations.	Objection/ Disagree	See the response to ID Nos. 3, 12, and 253.	Unacceptable. See EPA responses to these comments.

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255.	USEPA	6/11/16	28-day Reproduction (Per Surviving Amphipod) Reference Envelope Comparison by Study Area Creek Mile; 28-day Reproduction (Per Surviving Female) Reference Envelope Comparison by Study Area Creek Mile	Figures 8-16 and 8-17	--	141	Figure 8-16 28-day Reproduction (Per Surviving Amphipod) Reference Envelope Comparison by Study Area Creek Mile and Figure 8-17 28-day Reproduction (Per Surviving Female) Reference Envelope Comparison by Study Area Creek Mile: These figures are incomplete, misrepresent the sources and only present an oversimplified account of the available data. The figures fail to present major sources of CERCLA contaminants. See comment for Figure 8-13 above. Also, the green triangles, while identifying stations with reproduction greater than the reference envelope, ignore the fact that reproduction in some of these stations is significantly different than controls as well. The figures also fail to present the actual reproduction on maps for both the study area and reference areas. Furthermore, because there is no accepted benchmark for successful reproduction, control normalizing these results is inappropriate and actual measured values should be presented instead. Revise these figures to add all sources of CERCLA contaminants, remove CSO diameters, add a laboratory control qualification to the green triangle key, and utilize the measured values rather than the control-normalized values when displaying results. Add companion figures that present the actual reproduction at all stations including reference area stations.	Objection/ Disagree	See the response to ID No. 253.	Partially acceptable. See response to ID No. 253.
256.	USEPA	6/11/16	10-day Survival Reference Envelope Comparison by Study Area Creek Mile	Figure 8-18	--	142	Figure 8-18 10-day Survival Reference Envelope Comparison by Study Area Creek Mile: This figure is incomplete, misrepresents the sources and only presents an oversimplified account of the available data. The figure fails to present major sources of CERCLA contaminants. See comment for Figure 8-13 above. Also, the green triangles, while identifying stations with survival greater than the reference envelope, ignore the fact that survival in some of these stations is significantly different than controls as well. The BERA also fails to present the actual percent survival on maps for both the study area and reference areas. Revise this figure to add all sources of CERCLA contaminants, remove CSO diameters, and add a laboratory control qualification to the green triangle key. Add companion figures that present the actual percent survival at all stations including reference area stations.	Objection/ Disagree	See the response to ID No. 253.	Partially acceptable. See EPA response to ID No. 253.
257.	USEPA	6/11/16	Leptocheirus Concentration-Response – Control-adjusted 10-day Survival 28 day survival, 28 day reproduction, 28 day growth	Figures 8-19a, 8-20a, 8-21a, 8-22a, 8-23a, and Figure 8-24a	--	143	Figures 8-19a , 8-20a, 8-21a, 8-22a, 8-23a, and Figure 8-24a Leptocheirus Concentration- Response – Control-adjusted 10-day Survival 28 day survival, 28 day reproduction, 28 day growth: The BERA argues convincingly that SEM metals are not available based on the AVS-SEM analyses. The weight of evidence in the BERA clearly dismisses the bioavailability of SEM metals based on three lines of evidence: the AVS- SEM analysis, the low concentrations of metals in pore water, and the extraction analyses performed within the BERA. This	Objection/ Disagree	The NCG does not intend to modify the assessment approach for metals or PAHs based on this comment, and will continue to follow best scientific practices and USEPA guidance. See the response to ID Nos. 16, 91, 132, and 142.	Partially acceptable. See response to Comment 231 and related comments.

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							figure (and the BERA) should not be re-introducing metals as a COPEC in the form of SEM metals. Furthermore, the BERA and these Figures use an unsupported concept: an SEM toxic unit approach. The BERA fails to support the development of an SEM TU approach which incorrectly assumes additivity given the various and very different mechanisms of action for metal toxicity, the various and different target organs associated with metal toxicity, and the complex biogeochemical properties of metals. The BERA makes reference to Naddy et al. (2014) to make the case that metal toxicity can be additive in an attempt to justify the use of SEM TUs. However, that work addressed metal toxicity in freshwater species (rainbow trout and Ceriodaphnia) under laboratory controlled conditions (that is, no other contaminants except cadmium, copper, and zinc). As these authors indicate, the assumption of additivity is very uncertain and "…may not hold true depending on the species, exposure duration, contaminants present, and other factors affecting toxicity." All of these uncertainties apply to Newtown Creek in which the species is Leptocheirus, the exposure duration is chronic (to pore water and sediments), the contaminant exposure is to multiple chemicals in pore water and sediment, and the overriding "other factor" is that the exposures in Newtown Creek are to salt water in which toxicity and metal solubility can be expected to be substantially different than in fresh water. There appears to be no support in the scientific literature for the development of application of SEM TUs, and the BERA should drop this unsupported analysis from consideration. Also, the work plan identifies 17 PAHs as the COPECs in sediment. The BERA and these Figures employ34 PAHs in the development of PAH toxicity units. This is an issue that should be addressed in an uncertainty section. Also, the footnote indicates that sample NC013 is not included in these Figures. Presenting only a subset of data misrepresents conditions in the study area. Delete the bottom graphs (SEM Metals TU vs 28-day Survival) because SEM metals are not bioavailable and SEM TUs have no relevance on the grounds that they were improperly developed. Revise the top graphics (PAH TU vs 28-day survival) to include all data including NC013, and use the COPEC 17 PAHs (with a discussion of the influence in the uncertainty section).			
258.	USEPA	6/11/16	Leptocheirus Concentration-Response – Control-adjusted 28 day survival, 28 day growth	Figures 8-19a, 8-20a, and 8-21a	--	144	Figures 8-19a, 8-20a, and 8-21a: Define the circle shown on figures in the legend.	Agree	The circles will be defined in the legend.	Acceptable

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259.	USEPA	6/11/16	Leptocheirus Concentration-Response Curves – Control-adjusted 10-day Survival, 28 day survival, 28 day reproduction, 28 day growth	Figures 8-19b, 8-20b, 8-21b, 8-22b, 8-23b, and 8-24b	--	145	Figures 8-19b, 8-20b, 8-21b, 8-22b, 8-23b, and 8-24b Leptocheirus Concentration-Response Curves – Control-adjusted 10-day Survival, 28 day survival, 28 day reproduction, 28 day growth: There is no basis to support adding PAH and Metal toxic units and correlating this to survival. As discussed above, SEM Metals TU are not technically supported, the PAH TUs include PAHS that are not COPECs (34 versus 17 in the workplan as amended). These Figures provide no insights into the quality of the fit line and how the line is justified given that the data are bimodal. Also, the footnote indicates that sample NC013 is not included in these Figures. Presenting only a subset of data misrepresents conditions in the study area. Finally, removal of confounding factors stations in the bottom graphs is misleading. Data for confounding factors is biased in the Creek and has not been presented for all sample locations. Therefore, the proposal to eliminate stations based on biased data is not defensible. Confounding factors discussions belong in the uncertainty section. Delete these figures because the x-axis is not justifiable, the regression is suspect and the data set is incomplete.	Objection/ Disagree	The NCG does not intend to modify the assessment approach for metals, PAHs, or confounding factors based on this comment, and will continue to follow best scientific practices and USEPA guidance. See response to ID Nos. 1, 16, 91, 132, 138, 139, and 142.	Partially acceptable. See response to ID No. 231 and related comments.
260.	USEPA	6/11/16	PAHs in Porewater – SPME Samples	Figure 8-25	--	146	Figure 8-25 PAHs in Porewater – SPME Samples: The figure can be misleading if taken in isolation because there are examples of stations with TU >1 (indicating PAH toxicity), but with high survival in the toxicity tests. Also, the PAH TUs include PAHS that are not COPECs (34 versus 17 in the workplan as amended). This figure requires a linkage to the actual toxicity test results. It is also short-sighted to present this type of analysis for only Total PAHs. A similar analysis should also be presented for PCBs. Revise this figure to include the toxicity test survival by station and add-in a separate figure for PCBs.	Objection/ Disagree	The NCG does not intend to modify the assessment approach for PAHs or this figure based on this comment, and will continue to follow best scientific practices and USEPA guidance. See response to ID Nos. 16, 91, and 132.	Unacceptable. Add text to the BERA that discusses the linkage between the graphed TUs and the toxicity observed during sediment bioassays. This discussion is critical because toxicity based on simultaneous exposure to multiple potentially toxic chemicals may be influenced by synergistic or antagonistic effects.
261.	USEPA	6/11/16	SEM Metals in Porewater – Toxicity Test (ex situ) Samples	Figure 8-26	--	147	Figure 8-26 SEM Metals in Porewater – Toxicity Test (ex situ) Samples: The BERA argues convincingly that SEM metals are not available based on the AVS-SEM analyses. The weight of evidence in the BERA clearly dismisses the bioavailability of SEM metals based on three lines of evidence: the AVS-SEM analysis, the low concentrations of metals in pore water, and the extraction analyses performed within the BERA. This figure (and the BERA) should not be re- introducing metals as a COPEC in the form of SEM metals. The BERA and this Figure use an unsupported concept: an SEM toxic unit approach. The BERA fails to support the development of an SEM TU approach which incorrectly assumes additivity given the various and very different mechanisms of action for metal toxicity, the various and different target organs associated with metal toxicity, and the complex biogeochemical properties of metals. Please see comment for Figures 8-19a though 8-24a for this detail.	Objection/ Disagree	The NCG does not intend to modify the assessment approach for metals based on this comment, and will continue to follow best practices and USEPA guidance. See response to ID Nos. 16, 91, and 132.	Partially acceptable. See response to ID No. 231 and related comments.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							There appears to be no support in the scientific literature for the development of application of SEM TUs, and the BERA should drop this unsupported analysis from consideration. Delete this figure because SEM metals are not bioavailable and use of SEM TUs is not technically supportable.			
262.	USEPA	6/11/16	Triad Toxicity, Porewater PAH, SEM Metals, and Bulk Sediment EPH C19-C36 Aliphatic Hydrocarbon	Figure 8-27	--	148	Figure 8-27 Triad Toxicity, Porewater PAH, SEM Metals, and Bulk Sediment EPH C19-C36 Aliphatic Hydrocarbon: The BERA argues convincingly that SEM metals are not available based on the AVS- SEM analyses. The weight of evidence in the BERA clearly dismisses the bioavailability of SEM metals based on three lines of evidence: the AVS-SEM analysis, the low concentrations of metals in pore water, and the extraction analyses performed within the BERA. This figure (and the BERA) should not be re- introducing metals as a COPEC in the form of SEM metals. The BERA and this Figure use an unsupported concept: an SEM toxic unit approach. See comment for Figures 8-19a through 8-24a. There appears to be no support in the scientific literature for the development of application of SEM TUs, and the BERA should drop this unsupported analysis from consideration. Also, the work plan identifies 17 PAHs as the COPECs in sediment. The BERA and this Figure employs 34 PAHs in the development of PAH toxicity units. The Figure should present the results with 17 and discuss the implications of not using 34 in the uncertainty section. The use of the C19 to C36 concentrations in the figure is misleading and there is no toxicological basis for applying a % of maximum to evaluate toxicity of this fraction; correlation does not equate with causation. The BERA implies that the elevated C19 to C36 concentrations measured using the EPH method are elevated only in the sediments next to the municipal point source discharges. The NCG draws this conclusion using select stations from the biased Phase 2 sediment sampling data. Note that these measurements of EPH were not conducted by the NCG as part of the Phase 1 sampling program. Characterization of this EPH range is also not available for the NYSDEC-approved from National Grid sampling program in the Turning Basin. Thus, the NCG chose to examine a parameter that was examined in a limited portion of the Creek, which also did not include the point source discharges, and then proceeds to use this data as the keystone of their analysis to associate sediment toxicity to CSO discharges solely based on proximity. Furthermore, the City notes that the NCG has not measured C19 to C36 compound concentrations as part of the Phase 2 point source sampling program. The USEPA- approved point source program was designed to quantify the concentrations of COPECs entering the Creek. The NCG did not propose to measure C19 to C36 compounds in point sources as a part of this plan. Without the measurement of C19 to C36 compounds in the discharge, the NCG has no basis to assign responsibility for sediment C19 to C36 compound	Objection/ Disagree	See response to ID Nos. 1, 16, 91, 122, 132, 138, 139, and 142. The NCG does not intend to modify the assessment approach for metals, PAHs, or confounding factors based on this comment, and will continue to follow best scientific practices and USEPA guidance. Figure 8-27 is a summary of the key toxicity risk drivers, PAHs and metals in porewater, and a key confounding factor represented by the C19-C36 aliphatic hydrocarbons. NCG disagrees that the % maximum is misleading. Figure 8-27 presents the relative magnitude of the C19-C36 aliphatic contribution in a meaningful way that shows magnitude and distribution across the Study Area and reference areas. Using an effects quotient for the C19-C36 data would show the same pattern. It is correct that correlation does not equate with causation. This is the primary reason that bulk sediment screening levels were only used to conservatively screen COPECs, not to evaluate baseline risk. For the CERCLA chemicals, the BERA included porewater analyses to directly measure bioavailable chemicals and refine the COPEC list. It is a fact that significant toxicity was identified where the CERCLA chemicals were not bioavailable in porewater. Confounding factors were evaluated because it is part of risk assessment best practices. There was observed toxicity but no exposure to toxic agents in porewater. It would be remiss not to address all potential confounding factors present at the site, including aliphatic hydrocarbons. The toxicity of UCM is a recognized problem in urban environments. C19-C36 aliphatics represents a UCM fraction that contains many chemicals including saturate, aliphatic, resin, and asphaltene fractions. These chemical groups are common in urban residential, commercial, and industrial runoff. The rationale and uncertainty around using the C19-C36 aliphatic as a surrogate for physical effects from long chain aliphatic hydrocarbons present in UCM is well developed in BERA Section 8.3.3.5.2. It is incorrect that without measurements of C19-C36 aliphatic compounds in the point source data, they cannot be attributed to point source discharges. Individual linear	Partially acceptable. See response to ID No. 231 and related comments.

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							contamination to any point source discharges. While the NCG failed to measure these compounds in point source discharges, it also failed to consider the available upland data where C19 to C36 compound concentrations have been evaluated for some sites. City review of sparsely available upland data for some sites show that elevated concentrations of C19-C36 compounds have been measured in upland refinery sites at high concentrations. For example, the C19 to C36 concentration in the soils at the upland DAR site Quanta where various oils were refined, are elevated, with an average concentration of 480,000 mg/kg (nearly 50 percent). TPH concentrations in soil samples from the BCF oil refining site were as high as 85,000 mg/kg while those at National Grid (based on 3 samples only) were as high as 30,000 mg/kg. Actual NAPL samples from the upland sites have higher concentrations of the TPH ranges. For example, the average TPH concentration from LNAPL samples from the Quanta site is 780,000 mg/kg. Also, this figure is missing PCBs, which may also be influencing toxicity. Finally, the implication of this figure is that the parameters graphed have an additive effect on toxicity, and together account for the differences in toxicity observed throughout the study site and the reference areas. However, no statistical analysis has been performed to demonstrate that, and simply showing correlations does not indicate causation. Delete this figure because it misrepresents the risk, is not based on causation but instead relies on correlation and selects only subsets of the available data for inclusion (i.e. metals are not bioavailable, C19-C36 data set is biased and missing data and % of maximum is not toxicologically supported, sum PAH TU needs to be correctly defined based on workplan COPECs, and PCBs are missing).		alkanes were measured for point source and sediment programs and provide the foundation for developing a mass balance model of hydrocarbon source contributions and sediment loading. The porewater PCB TRV used for the benthic toxicity evaluation was based on current scientific literature and is defensible. Porewater PCBs were below the benthic TRV, and therefore, they are not considered as benthic risk drivers and were not included in Figure 8-27.	
263.	USEPA	6/11/16	Leptocheirus Test Porewater Sulfide Results and Figure 8-29 28-day Leptocheirus Test Porewater Sulfide Results; 28-day Leptocheirus Test Porewater Sulfide Results	Figures 8-28 and 8-29	--	149	Figure 8-28 10-day Leptocheirus Test Porewater Sulfide Results and Figure 8-29 28-day Leptocheirus Test Porewater Sulfide Results: These figures attempt to make the case that pore water sulfides may be confounding the measurement of sediment contaminant toxicity based on a chain of assumptions that are weakly linked, employ uncertain assumptions, and are inappropriately applied to the Leptocheirus testing. The sulfide "benchmark" proposed and shown on these figures was created by NCG and is not supported in the literature. The BERA uses the following chain of assumptions: (1) The test organism, Leptocheirus (standard test organism) has the same exposure route to pore water sulfide as another organism, Rhepoxynius, not tested in the BERA; (2) data from testing done on the amphipod Rhepoxynius demonstrates that for Rhepoxynius "a porewater sulfide concentration of 20 mg/L was determined to be a level above which a greater likelihood of toxicity was possible"; (3) two samples in the ten day Leptocheirus testing and 6 samples in the 28 day Leptocheirus testing had pore	Objection/ Disagree	The NCG does not agree that these figures should be deleted. The use of the Caldwell (2005) sulfide data was reasonable in the effort to address confounding factors. The NCG does not intend to modify the assessment approach for sulfides based on this comment, and will continue to follow best practices and USEPA guidance. See also the response to ID No. 58.	Unacceptable. Current support for the 20 mg/L sulfide benchmark is not sufficient. Either provide appropriate support for the benchmark, or remove it from the figures and text.

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							water sulfide levels exceeding 20 mg/L, suggesting these are toxic in Leptocheirus. There are a number of flaws in this chain of logic that invalidate the development of the sulfide pore water concentration, 20 mg/L, as a concentration that may indicate a "greater likelihood of toxicity was possible". These flaws include: (1) There is a fatal flaw in the assumption that Leptocheirus has an exposure to porewater similar to that of Rhepoxynius. Specifically, Leptocheirus builds tubes while Rhepoxynius is a free burrowing amphipod (Hoffman et al., 2003). The EPA guidance (USEPA, 2001) recognizes this and further notes that "tube-building amphipods circulate oxygenated water through their burrows, thus reducing their exposure to pore water hydrogen sulfide (emphasis added)." In doing so, EPA recognizes that the use of Leptocheirus minimizes the potential for sulfide to be a confounding factor. In fact, the BERA itself recognizes that there is no sulfide benchmark for the Leptocheirus test on page 81 where it states that "a sulfide porewater level has not been established in these protocols" (this is a reference to the fact that the EPA Leptocheirus guidance does not establish a sulfide criterion for the test). (2) In addition, the reference upon which the BERA depends to develop this 20 mg/L "…level above which a greater likelihood of toxicity was possible…" is a citation that the BERA makes to a paper (Caldwell, 2005) presented at a conference. We were unable to find or obtain the data supporting the development of this uncertain effect level. The BERA is explicitly developing a sediment benchmark and fails to provide the data used in the development of the 20 mg/L level of likely toxicity, nor any peer review by EPA. (3) The BERA does not address the application of uncertainty factors in deriving this toxicity level as is standard practice in the development of benchmarks or toxicity values. The dependence on a single experiment and the vague description of the derived effect concentration is not consistent with EPA process for the use of a toxicity value for use in a baseline assessment and more consistent with application as a screening level benchmark for use in a Phase I assessment. Delete these figures because the benchmark created by NCG for sulfide is unsupported and the basis for including sulfides as a confounding factor is flawed.			
264.	USEPA	6/11/16	Spatial Distribution of Cadmium, Copper and Selenium in Study Area Polychaete	Figures 10-1, 10-2, and 10-3	--	150	Figure 10-1, 10-2, 10-3 Spatial Distribution of Cadmium, Copper and Selenium in Study Area Polychaete Tissue and Sediment: There appears to be a data gap between mile 2.0 and 2.4. Also, because the river is relatively wide, presenting these data on a map as well would better identify the actual location where these samples were collected. Revise to include a series of associated maps	Clarification	The locations of the polychaete bioaccumulation stations are included in Figure 4-4. The text will be revised to include this reminder when these tables are introduced and a note will be added to these tables indicating the same. The bioaccumulation stations were selected following a review of the Phase 1 surface sediment data to include a range of bioaccumulative compound concentrations in	Acceptable, pending the revised discussion.

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
			Tissue and Sediment				showing these results in a geographic context.		surface sediment. The data indicated there was not a significant change in surface sediment concentrations in this area of Newtown Creek, so no stations were included from this area.	
265.	USEPA	6/11/16	Study Area Species Rarefaction Curves for Expected Species Richness, Diversity	Figures 10-4 and 10-5	--	151	Figures 10-4 and 10-5 Study Area Species Rarefaction Curves for Expected Species Richness, Diversity: Please explain the basis of the error bars.	Agree	An explanation of the basis of the error bars will be provided in the text and in the figures.	Acceptable
266.	USEPA	6/11/16	Statistical Difference in Study Area and Reference Area Species Richness, Diversity	Figures 10-6 and 10-7	--	152	Figures 10-6 and 10-7 Statistical Difference in Study Area and Reference Area Species Richness, Diversity: The BERA states that these indices cannot be causally linked to CERCLA COPEC concentrations because non-COPEC factors such as salinity likely influence the findings and the uncertainty in assessing fish populations is high. As a result, the analysis implied in the figures has no value in assessing the risks posed by exposure to CERCLA contaminants. As a result, the value of these figures is unclear, and the figure should be deleted or moved to an uncertainty section.	Disagree	The discussion in Section 10.7.4 on the effects of salinity on fish species richness is relevant to the risk characterization and should be retained. The biological community is affected by the cumulative effect of all stressors, particularly in an urban estuary. The BERA text will be revised to reflect this.	Partially Acceptable. Pending revised text. Discussions of salinity as a confounding factor should be presented in the Uncertainty section.
267.	USEPA	6/11/16	Percentage of Shoreline Type in Study Area and Reference Areas	Figure 11-1	--	153	Figure 11-1 Percentage of Shoreline Type in Study Area and Reference Areas: The category “Developed (with vegetation)” is not capturing a unique habitat. Revise this figure to reflect two categories – “Developed” or “Vegetated (no development)” to accurately reflect the shoreline types.	Disagree	Developed (with vegetation) and developed (no vegetation) are two unique habitat types. The BERA text will be revised to describe why these two habitat types are believed to be different.	Acceptable
268.	USEPA	6/11/16	Percentage of Vegetation Health in Study Area and Reference Areas	Figure 11-2	--	154	Figure 11-2 Percentage of Vegetation Health in Study Area and Reference Areas: The ranking of the different areas is very subjective and it is not appropriate to combine “Developed (with vegetation)” with “Vegetation (no development)”, since these areas are not equivalent habitat types. Delete this figure because it is not objective and misleads by treating developed and non- developed (both with vegetation) as a single category.	Disagree	The figure is not misleading. It is presenting the relative health of the vegetation along the shoreline of the Study Area and the reference areas, regardless of whether the vegetation is associated with developed or non-developed shoreline. As discussed in the BERA and as performed in the Phase 1 surveys, the comparison is based on the diversity of the plant species, how many vegetative canopies were present, how stressed the vegetation appeared, and the width of vegetation (e.g., where good vegetation has an average width of 8 feet, moderate has an average width of 6 feet, and poor has an average width of 3 feet).	Unacceptable. Drop Figure 11-2, and remove associated text from the BERA.
269.	USEPA	6/11/16	Relationship Between Study Area Sediment and Polychaete Tissue Data – Total Dioxin/Furan TEQ 1998 (Avian) (KM) (MDL);	Figures 11-5a and Figure 11-5b	--	155	Figure 11-5a Relationship Between Study Area Sediment and Polychaete Tissue Data – Total Dioxin/Furan TEQ 1998 (Avian) (KM) (MDL) and Figure 11-5b Relationship Between Study Area Sediment and Polychaete Tissue Data – Total PCB Congener (KM) (MDL): In these figures, the NCG constructs regressions between sediment and Polychaete Tissue concentrations. For each chemical group the NCG developed a single regression line through all the data assuming that there are no local effects from the different tributaries. Visual review of Figure 11-5a would indicate that there are likely different relationships	Disagree	The one Dutch Kills sample shown in Figure 11-5a is one of five replicates. The other four samples for this location are clustered in with the relationship exhibited by the rest of the data in Figure 11-5a. Moreover, the fact that we do not see this sample point as an outlier in the PCB relationships (Figures 11-5b and c) indicates that the process of bioaccumulation is likely similar in this replicate as in the rest of the dataset. Similarly, the English Kills samples shown in Figure 11-5a fall in line with all other samples in Figures 11-5b and c. Finally, the avian TEQ value in tissue for the one Dutch Kills sample is similar to the other Dutch	Unacceptable. The data should also be analyzed for each of the individual study area segments, along with the combined study area.

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			Relationship Between Study Area Sediment and Polychaete Tissue Data – Total PCB Congener (KM) (MDL)				for English Kills and Dutch Kills at a minimum. The NCG should first investigate whether tributary effects should be included in these regression, before defaulting to a single regression for each chemical. Update these figures based on tributary effects.		Kills samples; it is the concentration in sediment that is different. Based on this information, we conclude that this one sample is likely an outlier in the measured sediment dioxin/furan concentrations. An alternative based on a different relationship for Dutch Kills would contradict the evidence provided by the other four samples, and would contradict the information provided by PCBs, leading to unnecessarily and unrealistically complex hypotheses regarding different bioaccumulation processes in different parts of the system. We conclude that it is reasonable to disregard this one sample and use the overall bioaccumulation relationship presented in Figure 11-5a.	
270.	USEPA	6/11/16	Possible Habitat Suitable for Emergent Macrophytes	Figure 12-1	--	156	Figure 12-1 Possible Habitat Suitable for Emergent Macrophytes: This figure is misleading. All shoreline within the river should have a slope, but this slope for some sections of the shoreline is not presented on the map. This analysis should be extended throughout the study area. Even areas lacking intertidal zones (always submerged) still have a slope. Even if the figure is only presenting the slope in areas where intertidal areas exist (as noted on the map that only areas above -0.3 feet NAVD88, and thus above MWL, were included), there appear to be slopes presented for areas with no intertidal area (i.e. the uppermost part of Dutch Kills). Furthermore, the results do not appear to have been confirmed with the bathymetry data. Revise the figure to assess all shorelines throughout the study area. Also, confirm the mapping with bathymetry data and provide the calculations that support the slope designations.	Agree	The information in the figure will be checked and revised as appropriate.	Acceptable
271.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157a	Attachment A: The following are examples for comments made for this attachment (Attachment A-12), make sure these comments are also addressed in other subfolders of Attachment A. a. The selection of data usability in risk screening (RISK) and baseline risk assessment (BASELINE) is following a complex decision rules provided in the BERA text Section 4.3. Thus, to ease the reviewer in using the data files provided in Attachment A, a column should be added to each of the data files stating the rationale for data usability selection (i.e., reason for “0” or “1” in the RISK or BASELINE usability column).	Clarification	Due to the vast amount of data available, adding a column to each of the data files indicating the rationale for each row would require a significant amount of time and not provide any added value to the risk assessment. Alternatively, to support the use of the files, a tab can be added to each file stating the decision rules.	Acceptable
272.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157b	b. In striped bass data files, many data records are missing “sys_loc_code” which shows the sampling zone. For example, sample FSZ1SB-R-001-20140603-WB does not have sys_loc_code in striped bass data files.	Agree	The sys_loc_code in the striped bass data files will be populated where required.	Acceptable
273.	USEPA	6/11/16	Attachment A – Baseline	--	--	157c-i	c. For individual chemical, only one record of data should be provided since there is inconsistency in	Agree/ Clarification	The record difference is because the FSZ1SB-R-001-20140603-WB sample is a reconstituted whole-body sample	Acceptable

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			Ecological Risk Assessment Data and Calculation Files				how the data were provided in the data files. i. Some sample has one record of data while other has multiple records. For example, arsenic concentration in striped bass. There are four records of data for sample FSZ1SB-R-001- 20140603-WB and one record for sample FSZ1SB-001W-201406. For sample FSZ1SB-R-001- 20140603-WB, one marked as usable for RISK (data with 'U=1/2'), one marked as usable for BASELINE (data with 'U=0 (MDL)'), and two marked as unusable. Arsenic is detected in all samples, and arsenic is not used in any summation of chemicals. Thus, only one record of data should be provided.		and there are four different ways to reconstitute the data, depending on the detection status of the tissue data making up the reconstituted total. The other sample is not reconstituted so just one record is provided. As requested, the data files that include reconstituted data will be updated to include the record used for the SLERA and the record used for the BERA.	
274.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157c-ii	ii. Not all MDL or RL are provided in the data files. The "Method_Detection_Limit" and/or "Reporting_Detection_Limit" columns in the data files are marked as 'NaN', but there is value in the "Result_Value" column for nondetected concentration which represent either the MDL or RL value. For example, silver is not detected in sample FSZ2SB-R-001-20140606- WB with "Result_Value" of 0.05, but the corresponding RL columns as 'NaN'. The inconsistency should be corrected.	Agree/ Clarification	Tissue concentrations include calculated chemical group totals and calculations based on reconstituted concentrations from analyzed tissue types. MDL and RL values as reported by the analytical laboratories are not provided for calculated values. Pending internal review, the RL and MDL fields associated with calculated totals and reconstituted results will be revised as needed to report "NaN." An RL and MDL will be provided for all other results.	Acceptable
275.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157c-iii	iii. Results for 'U=1/2' or 'U=1/2 (MDL)' in the "Result_Value" should be different than results for 'U=0' and 'U=0 (MDL)'. For example, silver results for sample FSZ2SB-R-001-20140606- WB has "Result_Value" of 0.05 for both 'U=0' and 'U=1/2'. Correct as necessary.	Clarification	The values for silver provided in the example are correct and follow our data treatment rules. As indicated in the draft BERA report, for both U = 0 and U = 1/2, if both tissue types are non-detect, the non-detects are reported at the RL or MDL. Under this scenario (both [or all] tissue types being non-detect), the U = 0 and U = 1/2 totals will be equal.	Acceptable. Pending additional clarifying footnote or text.
276.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157d	d. Section 4.3.4.2 on page 35 of BERA states "when there were fewer than three detected constituents, the KM total was not calculated." Thus, KM should not be calculated for summation of chemicals with less than three chemicals (e.g., sum DDD in striped bass). Make necessary corrections.	Agree/ Clarification	Consistent with Section 4.3.4.2 of the draft BERA report, KM totals were not calculated when there were fewer than three detected constituents. Chemical names will be corrected as necessary.	Acceptable
277.	USEPA	6/11/16	Attachment A – Baseline Ecological Risk Assessment Data and Calculation Files	--	--	157e	e. For summation of chemical, treatment of NDs were reported in four ways, KM RL, KM MDL, U=1/2 (based on half of RL), and U=0 (based on MDL) stated on Section 4.3.4.1 (pages 34 and 35 of the text. However, the data files reported the data in more than four ways. In addition, in some cases there are two records for U=0 based on MDL. The data results appear to be identical, but there is inconsistent "CALC_NAME" and "CALC_NAME_4PROUCL". For example, sum DDT	Agree/ Clarification	See the response to ID No. 273. The data files that include reconstituted data will be updated to include the record used for the SLERA and the record used for the BERA.	Acceptable

ID No.	Reviewer	Comment Date	Section Name/Topic	Section/Table/ Figure No.	Page No.	Reviewer Comment No.	Comment Text	Category	Response/Proposed Path Forward	EPA Response
							in striped bass for sample FSZ1SB-R-001-20140603-WB has 7 records: Sum DDT (KM) (RL), Sum DDT (KM) (MDL), Sum DDT (U=1/2), Sum DDT (U=0), Sum DDT (U=1/2) (MDL), and two Sum DDT (U=0) (MDL). Thus, unusable data (U=0 based on RL, and U=1/2 based on MDL) should not be included in the data files or the inconsistency should be corrected.			
278.	USEPA	6/11/16	Attachment C1, Benthic Community Analysis Weisberg Biotic Index Scores	--	--	158a	Attachment C: a. Attachment C1 Benthic Community Analysis Weisberg Biotic Index Scores: This table lists "Average of Percent Sensitive Score". However, Table 8-2 Benthic Community Dominance Summary does not have species listed as "Pollution Sensitive". Confirm that there are no "pollution sensitive" species included in the WBI score calculation.	Clarification	This will be checked.	Acceptable
279.	USEPA	6/11/16	Attachment C2, Weisberg Biota Index Versus Sediment COPECs	--	--	158b	b. Attachment C2 Weisberg Biota Index Versus Sediment COPECs: Define yellow circles in most figures presented in this attachment.	Clarification	Yellow circles will be defined.	Acceptable

Category Key
Minor: Takes some work to provide.
Agree: Agree with this comment.
Disagree: Disagree with this comment.
Clarification: Response provides clarification to the comment or clarification on the comment is requested.
Discussion: Comment should be discussed with the NCG.
Comment Noted: The comment has been noted.
Objection: The NCG objects to language and tone of the comment. Please see attached letter from W. David Bridgers to Michael Mintzer and Caroline Kwan, dated August 1, 2016.
Comply: The comment will be complied with even though the NCG does not agree with USEPA's request.

Acronyms:

µg/gOC = microgram per gram of organic carbon
µg/L = micrograms per liter
3Ps = pharmaceuticals, personal care products, pathogens, and endocrine disruptors
ANOVA = analysis of variance
AVS = acid volatile sulfide
BERA = *Baseline Ecological Risk Assessment*
BERA PF = *Baseline Ecological Risk Assessment* problem formulation
BMI = benthic macroinvertebrate
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CM = creek mile
CN = cyanide
COPC = contaminant of potential concern
COPEC = contaminant of potential ecological concern
CPUE = catch per unit effort
CSM = conceptual site model
CSO = combined sewer overflow
DAR = *Data Applicability Report*
DDD = dichlorodiphenyldichloroethane
DDT = dichlorodiphenyltrichloroethane
DDx = 2,4′ and 4,4′-DDD, -DDE, -DDT
DMMP = Dredged Material Management Program
DO = dissolved oxygen
DQO = data quality objective
EcoSSL = Ecological Soil Screening Level
EMF = exposure modifying factor
EPA or USEPA = U.S. Environmental Protection Agency
EPC =exposure point concentration
EPH = extractable petroleum hydrocarbon
EqP = equilibrium partitioning
ERED = Environmental Residue Effects Database
ERM = effects range median
ES = executive summary
FoD = frequency of detection
FS = Feasibility Study
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
HQ = hazard quotient
KM = Kaplan-Meier
LOAEL = lowest observed adverse effect level
LOEC = lowest observable effect concentration
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
LRM = logistic regression model
m^2 = square meter
MDL = method detection limit
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
MGP = Manufactured Gas Plant
MWL = mean water level
NAPL = nonaqueous phase liquid
NAVD88 = North American Vertical Datum of 1988
NCG = Newtown Creek Group
ND = not detected
NOAEL = no observed adverse effect level
NOEC = no observed effect concentration
NRWQC = National Recommended Water Quality Criteria
NY = New York
NYC = New York City
NYCDEP = New York City Department of City Planning
NYSDEC = New York State Department of Environmental Conservation
OSWER = Office of Solid Waste and Emergency Response
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PDRC = Phelps Dodge Refining Corporation
PEC = probable effect concentration
Phase 2 RI Work Plan Volume 1 = *Phase 2 Remedial Investigation Work Plan – Volume 1*
ppt = parts per trillion
PRG = Preliminary Remediation Goal
QA/QC = quality assurance/quality control
QAPP = Quality Assurance Project Plan
RAGS = Risk Assessment Guidance for Superfund
RBP = Rapid Bioassessment Protocol
RI = Remedial Investigation
RI/FS = Remedial Investigation/Feasibility Study
RL = reporting limit
RPD = relative percent difference
SEM = simultaneously extracted metals
SGVoc = a Sediment Guidance Value expressed in units of microgram of contaminant per gram of organic carbon
SL = screening level
SLERA = screening level ecological risk assessment
SMARM = Sediment Management Annual Review Meeting
SMS = Sediment Management Standards
SPME = solid-phase microextraction
SQT = sediment quality triad
TBD = to be determined
TEQ = toxic equivalence quotient
TM = technical memorandum
TOC = total organic carbon
TPH = total petroleum hydrocarbon
TRV = toxicity reference value
TSS = total suspended solids
TU = toxic unit
U = 0 = Non-detect values are treated as zero
U = 1/2 = non-detect values are treated as 1/2 the method detection limit or reporting limit
UCL = upper confidence limit
UCM = unresolved complex mixture
WBI = Weisberg Biotic Index

References:

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December 22, 2017: *Newtown Creek NPL Site/Newtown Creek Group Notice of Dispute Resolution regarding the BERA*, submitted to EPA by Waller Lansden Dortch & Davis, LLP (Waller), on behalf of the Newtown Creek Group (NCG).

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December 22, 2016

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Re: Newtown Creek NPL Site/Newtown Creek Group
Notice of Dispute Resolution regarding the BERA

Dear Michael and Caroline:

I write to inform you that the members of the Newtown Creek Group (the "NCG") hereby invoke Dispute Resolution, pursuant to paragraphs 64-66 of the "Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study" (the "AOC"). The NCG is invoking Dispute Resolution in response to Caroline Kwan's e-mail of December 08, 2016 informing the NCG: (1) that EPA disapproves in part with Anchor QEA's proposed modifications (Anchor QEA's Response Matrix August 2016) to Anchor QEA's Draft Baseline Ecological Risk Assessment submittal (February 2016); (2) that it has to submit a modified Draft Baseline Ecological Risk Assessment responsive in full to the attached EPA responses (December 2016); and (3) that Anchor QEA's resubmittal, responsive to all EPA comments shall be provided by no later than January 23, 2017. The NCG is invoking Dispute

Resolution because the January 23, 2017 submittal deadline is unreasonable and unnecessary, and because the NCG believes that a number of directives included in EPA's December 2016 responses are inconsistent with the methodologies and analyses included in the EPA-approved Phase 2 RI Work Plan – Volume 1 (Anchor QEA 2014a), are not supported by the use of the best available science as incorporated in EPA guidance documents, and are not supported by the data collected and analyses performed as included in the Draft Baseline Ecological Risk Assessment (Anchor QEA – February 2016), also as explained below. Additionally, as explained below, there are a number of directives in EPA's December 2016 responses that the NCG believes are confusing and, in some cases, appear to be contradictory. The NCG is not including these directives in this formal dispute, but respectfully requests an opportunity to meet with EPA to discuss these directives to work toward resolution on an agreed upon approach to incorporating these directives into the revised risk assessment report. The NCG reserves its rights to include these items in the dispute if discussions with EPA do not result in an agreed upon approach.

The NCG is also concerned with several administrative aspects of this review and Dispute Resolution process. Specifically:

- EPA took almost 26 work weeks to review the document in dispute, then imposed on the NCG a very stringent deadline, which time period included the Christmas / New Year Holidays, to respond to the numerous and somewhat conflicting comments. This is inconsistent with obtaining a quality work product for public stakeholders.
- In addition to our substantive concerns with EPA's comments on the BERA, the NCG wants to discuss with EPA the identity and role of the EPA decision maker for disputes. This is similar to an issue we previously have discussed with EPA. The NCG reserves its rights with respect to this issue pending our further discussion with EPA on this matter.

The January 23, 2017 Deadline for Submission is Not Reasonable and Should Be Reset to Provide the NCG With Adequate Time to Complete the BERA Following the Completion of the Dispute Resolution Process.

The NCG submitted its comment response matrix on August 1, 2016. EPA took 129 days to provide its response. In that response, EPA has directed the NCG to undertake a number of additional statistical analyses in addition to making numerous revisions to the text. Forty six days is not an adequate amount of time in which to complete that work in ordinary circumstances, and because that 46 day period includes the holiday season, EPA has effectively given the NCG far fewer than 46 days in which to complete that work. Moreover, many of EPA's comments are unclear, and the NCG will need to secure clarification from EPA on those comments before it can commence with much of the required work. For those reasons, EPA should work with NCG to set a reasonable submission deadline that permits the NCG an adequate amount of time to submit the BERA once the parties have completed the dispute resolution process. Given the recent extension of the RI Report review and approval process presented by EPA on December 1, 2016, there is not a time-critical driver to finalize the BERA within the first quarter of 2017.

EPA's Directives to Compare Sediment Toxicity and Benthic Community Results in the Study Area to the Results from Each of the Four Phase 2 Reference Areas and to Screen Reference Area Chemistry Data Against the Acceptability Criteria Used by EPA in its Phase 2 Reference Area Selection Process is Inconsistent with the EPA-Approved Phase 2 RI Work Plan Volume 1; Does Not Reflect the Best Available Science to Evaluate Exposure to Sediment-Sorbed Contaminants; and Will Not Result in Risk Management Decisions That Consider the Important Anthropogenically Caused Stressors in the Study Area. EPA's Directives on these items are included in Comment ID Nos. 3, 12, 95, 106, 107, 108, and 125.

EPA guidance clearly and unequivocally states: "The reference area should have the same physical, chemical, geological, and biological characteristics as the site being investigated but has not been affected by the activities on the site" (EPA 2002). The Newtown Creek Study Area, in the past and currently, is an industrialized waterbody in one of the largest urban centers in the world and is impacted by ongoing discharges from large combined sewer overflow (CSO) outfalls located primarily in the tributaries and in the vicinity of the Turning Basin. Suitable reference areas should also have these attributes, consistent with EPA guidance. The EPA-approved *Remedial Investigation/Feasibility Study Work Plan* (AECOM 2011) listed eight preliminary reference areas based on a review of available information. These eight preliminary reference areas are almost exclusively industrial waterbodies and many of them are influenced by ongoing CSO discharges. The selection of final reference areas for the Baseline Ecological Risk Assessment (BERA) was an EPA-led process started in 2011 that led to the selection in 2014 of four reference areas, one from each of four categories defined by whether areas were industrialized or not and whether the waterbodies were impacted by CSO discharges or not.

The selection process was informed by data collected in October 2012 as part of the EPA-approved reference area reconnaissance study, in addition to existing available data. During the final selection process, EPA in a technically incorrect manner, downplayed the importance of identifying reference areas with the same physical, chemical, geological, and biological characteristics as the Study Area by applying low weighting factors to the metric scores developed by the NCG for these characteristics on the basis that many of the metric scores were qualitative, regardless of the obvious similarities between these areas and Newtown Creek. Conversely, EPA applied a high weighting factor to a series of "quantitative" metrics meant to evaluate the acceptability of candidate reference areas on the basis of sediment chemical contamination. Throughout this process EPA has effectively ignored its own guidance documents (Burgess 2009; Burgess et al. 2013; EPA 2003, 2005, 2012), which indicate that bulk sediment chemistry is a poor predictor of sediment toxicity. As a result of applying low weighting factors to metrics at least as important as sediment chemical contamination and a high weighting factor to a metric that is a poor predictor of adverse effects, EPA effectively skewed the selection of three reference areas out of a total of four that are very different from Newtown Creek, currently and in the future.

The NCG as directed by EPA had no choice but to accept the outcome of this flawed process, and subsequently developed a Work Plan for sampling these four reference areas and analyzing the data in the BERA. The Phase 2 RI Work Plan Volume 1 is clear that the data quality objectives process intended to combine the data from the four reference areas (see final paragraph of Section 3.2.7 page 70 of Phase 2 RI Work Plan Volume 1) to evaluate potential impacts to the benthic community and to evaluate sediment toxicity as part of an integrated sediment quality triad approach. EPA approved this Work Plan, including the unambiguous focus on porewater as the primary route of exposure for benthic invertebrates to contaminated sediments. The process should be driven by the scientific data, not a desired outcome.

Notwithstanding its approval of the Phase 2 RI Work Plan Volume 1, EPA is now directing the NCG to separate the four reference areas for purposes of comparing the results of benthic community and sediment toxicity studies in these reference areas with the Newtown Creek Study Area, even though three of the four reference areas bear little to no resemblance to Newtown Creek. Comparing the individual results from three of the four reference areas to results from the Study Area will not drive any meaningful conclusions regarding benthic community impacts and/or sediment toxicity because these three reference areas have limited similarity to Newtown Creek currently and in the future, and these comparisons are meaningless with respect to making risk management decisions. In addition, such comparisons, as seen at other EPA sites selection of flawed / biased reference areas only serve to drive unrealistic and unsustainable remedies.

In addition to the NCG's disagreement with incorrect comparisons using reference area data from a flawed reference area selection process, the NCG also continues to disagree with EPA's directive to screen the reference area sediment chemistry data using the same acceptability criteria employed by EPA in the same flawed final reference area selection process. The NCG has already commented on this directive, when EPA first raised it on January 28, 2016, in a memorandum submitted to EPA on March 3, 2016. In its memorandum, in addition to demonstrating that the Phase 2 RI Work Plan Volume 1 never contemplated going back to the reference area selection process, the NCG also effectively demonstrated that porewater concentrations of sediment contaminants of potential ecological concern (COPECs) were below levels associated with reduced survival of benthic invertebrates and, for this reason, all reference area stations should be used in the BERA. Arbitrary exclusion of select reference area stations by EPA, after the fact, raise significant due process questions that we believe deserve review and discussion. Section 8.3.3.5.2 of the BERA (Anchor QEA 2016) provides additional explanation about the causes of reduced survival at some reference area stations where porewater concentrations are below effect levels.

EPA's Directives to Compare Bulk Sediment COPEC Concentrations to Porewater COPEC Concentrations and to Move All Discussions Regarding Anthropogenic Confounding Factors to the Uncertainty Analyses Section of the BERA Trivializes the Importance of Understanding the Complex Processes that Control Equilibrium Partitioning of COPECs between Porewater and Sediment and Will Lead to Poorly Informed Risk Management Decision-making that Ignores the Contribution of "Non-CERCLA Stressors."

Sediment-Porewater Relationship

The following addresses EPA's responses to Comment ID Nos. 9, 16, 29, 91, 97, and 138 regarding the evaluation of COPECs in sediment and porewater.

EPA wants the BERA to evaluate porewater and bulk-sediment chemical data independently, and to also relate porewater chemistry to sediment chemistry to support risk management decisions. EPA has incorrectly interpreted the BERA to have ignored COPECs and to have only focused on porewater concentrations of polycyclic aromatic hydrocarbons (PAHs) and some metals in assessing risk to benthic macroinvertebrates.

To the contrary, the first step of the BERA was a comprehensive re-screening of all bulk-sediment chemical concentrations collected in Phase 1 of the RI, in Phase 2 of the RI, and by National Grid. Those chemicals were evaluated in the Screening Level Ecological Risk Assessment (SLERA) in Section 5 of the BERA according to the procedures presented in the EPA-approved Phase 2 RI Work Plan Volume 1 (Anchor QEA 2014a) and the *Baseline Ecological Risk Assessment Problem Formulation* (BERA PF; Anchor QEA 2014b). Per EPA directive, the sediment re-screen was conducted using EPA's hierarchy for selecting the screening levels. The chemicals identified as sediment COPECs were then evaluated in more detail in the baseline analyses of the BERA. As described in the EPA-approved Phase 2 RI Work Plan Volume 1 (Section 3), and the risk analysis plan of the BERA PF (Section 8.5), the sediment COPECs were evaluated in the baseline analyses by a comprehensive sediment toxicity testing program that included the synoptic measurement of porewater COPECs, as well as bulk sediment measurements of acid volatile sulfide (AVS) and simultaneously extracted metals (SEM), pre- and post-toxicity testing. As approved by EPA, porewater collected using peepers was analyzed for all metal COPECs, and porewater collected using solid-phase microextraction (SPME) was analyzed for all pesticide COPECs and all polychlorinated biphenyl (PCB) congeners.

As presented in the BERA, measured bulk sediment the sum of (∑) SEM – AVS values were all below zero (see BERA Attachment E, Figure E1-1), demonstrating the lack of bioavailability for these metals in sediment. Similarly, as presented in the BERA (see Section 8.3.3, Table 8-4a), the concentrations of most of the COPECs were below surface water thresholds, even at their maximum concentration (toxic units [TUs] less than 1). This is true for metals such as arsenic, chromium, and mercury, and cadmium and nickel, two of the five metals that are included in the SEM TU calculation, as well as organics. Sediment COPECs for which porewater TUs are greater than 1 are discussed at length in the BERA. However, after the screening process is completed, there is no need to further evaluate COPECs in bulk sediment, and there is no need to evaluate identified sediment COPECs for which porewater TUs are less than 1. EPA scientists have developed guidance that recognizes the limits of bulk sediment-based evaluations and recommends porewater-based evaluation to fully incorporate bioavailability (Burgess 2009; Burgess et al. 2013; EPA 2003, 2005, 2012).

With regard to the relationship between sediment and porewater COPECs, as acknowledged by EPA in its response to Comment ID No. 9, COPEC concentrations in porewater may or may not be related to COPEC concentrations in bulk sediment because of differences in chemical-specific bioavailability. It is not uncommon to have elevated bulk sediment concentrations and low bioavailability due to chemical partitioning, particularly to carbon (the Study Area has both high natural and anthropogenically derived organic carbon). Furthermore, even with measured porewater data, the complexity of sediment and porewater chemistry at a site such as Newtown Creek further adds to the challenges of interpreting the results of sediment toxicity tests. For example, as demonstrated in Figures

8-19 to 8-24 in the BERA, some of the sediment toxicity can be explained by porewater concentrations of PAHs. However, there are a number of stations for which the toxicity cannot be explained by porewater PAHs or any other porewater COPECs. However, this does not invalidate the usefulness of a porewater-based evaluation, particularly when considering the influences of confounding factors, as explained more fully below.

Confounding Factors

The following provides a response to EPA's Comment ID Nos. 1, 138, 139, and 235, which concern the confounding factor analysis. EPA states: "discussions on the non-CERCLA stressors or confounding factors should be eliminated from the report or at least discussed in the uncertainty section." Also: "Removing stations based on claims of confounding factors is misleading and unsupported by the data set, which is arbitrary and biased because only a limited number of sample locations were included in the C19-C36 analysis shown by Anchor as described by the City in multiple comments in the primary submittal."

In contrast to EPA's statements, the analysis is neither arbitrary nor biased because it is supported by site-specific data and published scientific information. In fact, deleting the confounding factors analysis from the main body of the report would be misleading, arbitrary, and factually incomplete, because it would leave in place concentration-response relationships for CERCLA hazardous substances[1]

[1] CERCLA regulates not only "hazardous substances," but also "pollutants and contaminants." The latter term is broadly defined to include "any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism . . . will or may reasonably be anticipated to cause death, disease [etc.] . . . in such organisms." 42 U.S.C. § 9601(33). Thus, whatever under the applicable definition causes toxicity to benthic organisms in the creek is subject to CERCLA and is the proper subject of the risk assessment.

that are less robust and do not take into account the full range of site-specific data and scientific information available concerning the issues.

Furthermore, the BERA Problem Formulation, which was approved by EPA, clearly indicates that the confounding factors analysis was to be included in the risk characterization section of the BERA. As stated in Section 8.5.5: "The risk characterization will also include an evaluation of confounding factors as indicated in Section 8.5.2 for the benthic community and Section 8.5.3 for toxicity testing. These analyses will provide information on the uncertainties associated with the risk estimates of the CERCLA contaminants because of other stressors in the Study Area and will evaluate the degree to which these other stressors contribute to the total risk estimates."

The BERA contains a detailed analysis of the sediment toxicity results, and in particular, an analysis of the causative factors resulting in the observed toxicity. This analysis is performed in a manner consistent with current scientific practice. Following the state of the science, the analysis includes correlation analysis with CERCLA hazardous substances. The analysis focuses on porewater concentrations because these are considered by the scientific community to be more representative of biological availability than bulk sediment concentrations. [Note that porewater data are considered representative of the chemical availability for biological exposure; the actual exposure may be through porewater respiration or ingestion of sediment. The concept is that to the extent exposure is via sediment ingestion, bioavailability is best represented by porewater concentrations. This approach is consistent with EPA guidance (Burgess et al. 2013; EPA 2003, 2005, 2012]. It is well-accepted in the scientific community that correlation, although suggestive of causation, does not prove causation. As might be expected in a site with a long urban industrial history, toxicity is correlated with many substances. Therefore, additional, independent analyses were performed to evaluate the potential for CERCLA hazardous substances to be true causes of the observed effects. The first line of evidence was the, which as discussed previously, was based on screening against bulk sediment chemical concentrations. The second line of evidence was the analysis of SEM and AVS for a subset of metals. The third line of evidence was the comparison of porewater concentrations to toxicity benchmarks, for which water quality criteria and primary literature sources were used. Finally, following good scientific practice, inconsistencies in the data were evaluated as a line of evidence, in particular the observation of a wide range of toxicity results at similar CERCLA hazardous substance concentrations.

In particular, it was found that at low porewater PAH concentrations, samples with both high survival and low survival were found. Whereas, most samples exhibited a "classic" concentration-response relationship, some samples exhibited significant biological effects at low porewater PAH concentrations, which would not be expected to be high enough to elicit adverse effects. This inconsistency raised questions that are critical to the primary goal of the BERA, namely, to evaluate the presence of toxicity and the potential linkage of that toxicity to specific CERCLA hazardous substances.

The BERA then provided a detailed evaluation of these inconsistencies, which resulted in an improved relationship between PAHs and biological impacts after consideration of confounding factors. The observed impacts in the remaining samples were reasonably ascribed to other chemicals.

The only reason that EPA considers this analysis inappropriate for the main body of the risk assessment is because those additional chemicals are not CERCLA hazardous substances. Because they are not considered CERCLA hazardous substances, EPA has requested the analysis be placed into the Uncertainty Analyses section. However, no one to our knowledge disputes that they are pollutants of human origin. To remove them from the primary analysis removes scientific information arbitrarily based on a regulation-based classification of contaminants, despite the fact that they help explain the patterns in the data presented in the main body of the report. This weakens the usefulness of the BERA in meeting the needs of the project (i.e., supporting remedial decision-making concerning CERCLA hazardous substances).

Uncertainty analysis in the Superfund program as envisioned by EPA focuses on uncertainty bounds, such as evaluating model assumptions to establish the direction and magnitude of outcomes, and presenting ranges of exposure parameters and toxicity reference values relevant to site conditions (EPA 1989), as well as factors that in general reduce the precision of the results. The analysis of confounding factors is not this, but rather, as described in Section 7.4.1 of EPA (1997), represents an uncertainty associated with the conceptual site model (CSM). The confounding factors in this BERA are anthropogenic compounds that are likely key players; their analysis is required to address inconsistencies in the biological response data and, therefore, to develop a reliable basis for decision-making. Without their inclusion, the CSM would be incomplete.

EPA's statement that "only a limited number of sample locations were included in the aliphatic hydrocarbon C19-C36 analysis" is not correct. C19-C36 was measured in all toxicity samples, both in the Study Area and reference areas. The confounding factor analysis focused on those samples with C19-C36 values exceeding a literature-based benchmark (as is typical practice in risk assessment) AND low PAH concentrations. The reason for this focus is as follows: for samples with elevated PAH concentrations, a potential default assumption is that PAHs are the driving force behind the biological response (even though this may not be true in samples with elevated concentrations of other anthropogenic chemicals). For samples with low PAH and low C19-C36, neither chemical is considered a likely cause of biological response, and so these samples are considered appropriate to include in the PAH concentration-response relationship. For samples with low PAH and elevated C19-C36, the current scientific literature suggests that PAHs are unlikely to be a cause of any observed toxicity. This same type of analysis was conducted for those samples where SEM TUs were greater than 1, with the same conclusions.

EPA, its technical consultants, and other regulatory stakeholders, are well aware of the valid technical basis of using porewater as a primary exposure vehicle and the presence and impact of non-CERCLA stressors in Newtown Creek. This action defies current science and is driven by non-technical rationale that is in inconsistent with the current EPA guidance and best scientific practices.

10-day Sediment Toxicity Test Results

The following provides a response to EPA's comment ID No. 11 concerning the 10-day sediment toxicity test.

EPA want the results of the 10-day acute and 28-day chronic sediment toxicity tests to be given equal consideration in the BERA. Furthermore, EPA want statements in the BERA regarding the static conditions and the lack of feeding in the 10-day test removed from the main text and included in the uncertainty section. The NCG disagrees with this based on the scientific literature and the findings presented in the BERA.

Sediment toxicity tests were conducted for the BERA using the amphipod, *Leptocheirus plumulosus*. The tests consisted of an acute 10-day survival test and chronic 28-day tests for survival, reproduction and growth. As discussed in the BERA (Sections 8.3.3.1, 8.3.3.5, 8.3.36), because the 10-day test is a static test with no renewal of the overlying water and because the organisms are not fed during the test, the health of the organisms and performance of the test is impacted (McGee et al. 1993 and 2004). McGee et al. (2004) cite a bioaccumulation study by Harkey et al (1997) with the freshwater amphipod, *Hyalella*, exposed to fluoranthene, in which unfed *Hyalella* had lower survival compared to fed *Hyalella.*

The impact of these test conditions is expressed in variability in the test results as discussed by Kennedy et al. (2009), and as demonstrated in the BERA by a contingency analysis of the test results (Section 8.3.3.6). The contingency analysis was performed with two datasets—one including all triad stations and one without the anthropogenic confounding factor stations. For these two datasets, the false positive and false negative error rates were determined for each test endpoint using three TU values to illustrate the sensitivity of the toxicity endpoint. For all test endpoints (10-day survival and 28-day survival, growth, and reproduction), false positive decision error rates are substantially higher with the confounding factor stations included in the analysis. When the confounding factor stations are removed, the false positive error rates decline to zero for the 28-day survival test, less than 3% for the 28-day growth tests (based on biomass and weight), and to less than 6% and 5% for the 28-day reproduction per surviving amphipod, and 28-day reproduction per surviving female amphipod, respectively. In contrast, for the 10-day test, when the confounding factor stations are removed, the false positive error rates remain at approximately 12%. This finding is consistent with the compromised test performance across the test samples due to a lack of feeding and static test conditions, indicating that increased sensitivity in unfed organisms is a function of organism condition rather than differences in exposure. Due to the lack of feeding or water renewal, the test animals were likely to experience environmental stressors unrelated to chemical exposure.

Based on these findings and discussion in the scientific literature, the results of the 10-day test are considered to be biased toward low survival. This is an important consideration in the interpretation of the sediment toxicity test results given the significance of sediment toxicity testing as a line of evidence in the BERA. Excluding a discussion of the deficiencies in the 10-day test from the main body of the report would be misleading, and give the appearance that the results of the 10-day acute test should be given equal consideration as the 28-day chronic tests, when this is clearly not the case. Furthermore, discussion of deficiencies and bias in the 10-day test should not be confined to the uncertainty section of the report as directed by EPA.

Other Items for Dispute

The following provides a summary of other dispute items the NCG would like to include for discussion with EPA.

Wildlife Seasonal Exposures

For the wildlife risk assessment, EPA states that the BERA should include a seasonal exposure of 1 for all receptors to provide bounding risk estimates in the risk characterization and not confine this analysis to the uncertainty section of the document (Comment ID No's 180, 181, 182, and 239). EPA's rationale is that "the selection of seasonal exposure does not appear to have taken into account the avian surveys that were conducted in the creek and reference areas." That is correct, the selection of seasonal exposure was *not* based on the field surveys, but was collected from the scientific literature and databases of wildlife surveys. Therefore, the seasonal exposures used in the BERA are supported by the literature, and are applicable for use in the risk estimates. It is therefore not necessary to include an arbitrary seasonal exposure of 1 in the risk estimates. As presented in the NCG's response to comments in 8/1/2016, the impact of using a seasonal exposure of 1 for all receptors can be discussed in the uncertainty section of the BERA.

Selection of Fish and Wildlife TRVs

EPA's position is that it is inappropriate to use geometric mean NOAELs and LOAELs as TRVs in the wildlife SLERA and baseline analyses, and that additional supporting evidence should be provided for the selection (Comment ID No's 6 and 72).

The NCG would like to clarify its approach to selection of TRVs. The wildlife TRVs (NOAELs and LOAELs) used in the BERA are the same TRVs presented in previous EPA approved screening level ecological risk assessment (SLERA) documents in 2012 and in 2013 (Anchor QEA 2012, 2013). The first of these presented the screening levels to be used in the SLERA, while the second presented the results of conducing a SLERA using the Phase 1 data. Second, it should also be noted that geometric mean TRVs are only used for a subset of the chemicals evaluated where applicable. For many of the chemicals evaluated, values were selected from paired NOAELs and LOAELs. The geometric mean TRVs that were selected are the same as those selected by EPA in the EcoSSL documents. EPA went through a rigorous process to select the TRVs that consisted of reviewing all available studies, scoring their quality, and eliminating studies that did not meet their quality criteria. EPA then used a systematic process to select the TRV. Given this rigorous approach, it does not make sense for the BERA to re-invent this process. The NCG proposes to clarify its approach by providing additional information in the BERA to support selection of TRVs for the SLERA as well as for the baseline analyses.

White Perch

EPA states that white perch should be used in the BERA risk analyses as a replacement for spot (Comment ID No's. 45, 158, and 213). As demonstrated by the Phase 2 field surveys, very few white perch were found in the Phase 2 surveys. The low numbers of white perch found is supported by NOAA Fisheries data. A query of catch time series for 1981 through 2016 shows that there are very white perch in the NY Harbor area. Because there were insufficient numbers of white perch to meet the DQOs, a decision was made at the time of collection to not include white perch in the BERA because they are not needed given that their role is fulfilled by other fish that are included in the BERA. Lastly, it is noted that in a 10/26/2016 document from EPA on the FS related biota sampling, neither white perch nor spot are required. Presumably, EPA *also* agrees that these species are not needed for the BERA.

Additional Responses to be Discussed with EPA

The following is a list of responses that require additional discussion with EPA to clarify responses that are confusing and/or appear to be contradictory. The NCG would like to meet with EPA as quickly as possible to agree upon a path forward for addressing these responses.

- Polychaete/sediment regression (Comment ID Nos. 186 and 269)

Surface water screening levels (Comment ID No. 216)

Conclusions

For the reasons set forth above, the NCG invokes Dispute Resolution. We look forward to meeting with EPA to attempt to informally resolve the dispute.

Sincerely,

W. David Bridgers

Common Counsel for the Newtown Creek Group

WDB/lsa

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January 20, 2017: *Selection of Wildlife Toxicity Reference Values and Tissue Effects Thresholds*. Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.

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MEMORANDUM

To:	U.S. Environmental Protection Agency	**Date:**	January 20, 2017
From:	Newtown Creek Group	**Project:**	171037-01.01
Re:	Newtown Creek Baseline Ecological Risk Assessment: Selection of Wildlife Toxicity Reference Values and Tissue Effect Thresholds		

The following provides a summary of the process used to select wildlife toxicity reference values (TRVs) and tissue effect thresholds for the Newtown Creek draft *Baseline Ecological Risk Assessment* (BERA; Anchor QEA 2016).

Wildlife

The BERA used no observed adverse effect levels (NOAELs) as wildlife TRVs in the Screening Level Ecological Risk Assessment (SLERA) to identify contaminants of potential ecological concern (COPECs) based on potential risk to avian and mammalian receptors. The COPECs were then evaluated using lowest observed adverse effect levels (LOAELs) as wildlife TRVs in the baseline analyses of the BERA. The NOAELs and LOAELs presented in the BERA report are the same as those presented in *Screening Level Ecological Risk Assessment: Technical Memorandum No. 1* (SLERA TM No. 1; Anchor QEA 2012), and used in the Phase 1 SLERA as documented in SLERA TM No. 2 (Anchor QEA 2013). Specifically, the same NOAELs and LOAELs have been carried through to the Phase 2 SLERA and baseline risk analyses presented in the draft BERA report (Anchor QEA 2016). In response to U.S. Environmental Protection Agency (USEPA) comments on the draft BERA, the attached tables have been updated to provide information on the rationale for selection of the TRVs. This information includes the source for the NOAELs, the test species, the test endpoint, whether a safety factor was applied by the authors or by Anchor QEA, and any other information relevant to interpretation of the NOAEL. Additional information on the wildlife TRV selection process is provided in the following sections.

Selection of NOAELs

The hierarchy for selection of the NOAELs is as follows:

1. **USEPA Ecological Soil Screening Level (Eco-SSL) Documents**

    - USEPA's Eco-SSL documents are used as the primary source for the wildlife NOAELs (e.g., USEPA 2005, 2007a). These documents are a compendium of relevant studies and toxicity data from the scientific literature for a particular chemical. USEPA reviewed the quality of the studies before completing a rigorous process to select the most appropriate NOAEL (see attached flow chart).
    - The NOAEL derived by USEPA is one of the following:
        - A geometric mean NOAEL for reproduction and growth
        - The highest NOAEL that is lower than the lowest LOAELs for reproduction, growth, or survival for a particular receptor group (avian or mammal)
    - Note, the lowest of these two NOAELS is always selected by USEPA.
    - The NOAEL derived by USEPA in the Eco-SSL document is the NOAEL used in the SLERA for avian and mammalian receptors.

2. **Sample et al. (1996)**

    - In the absence of an Eco-SSL-based value, NOAELs are selected for the SLERA from those reported by Sample et al. (1996) for reproduction and growth, over mortality. A summary of the study reported by Sample et al., and selection of the NOAEL, is provided in the SLERA tables (see Tables 5-5a and 5-5b).

3. **Other Literature Sources**

    - In the absence of a NOAEL in Sample et al. (1996), other literature sources are used to select NOAELs (e.g., Patton and Dieter 1980; USACHPPM 2005). A summary of the study reported by the authors, and selection of the NOAEL, is provided in the SLERA tables (see Tables 5-5a and 5-5b).

Notes:

- For the birds, 53% of the NOAELs are from the Eco-SSL documents or Sample et al. (1996), whereas for the mammals, 90% of the NOAELs are from these two sources (see Tables 5-5a and 5-5b, respectively).
- A geometric mean NOAEL from an Eco-SSL document is only used in a few instances, as follows:
  - For birds, for 4 out of 59 chemicals evaluated in the SLERA—cadmium, chromium, nickel, and zinc
  - For mammals, for 2 out of 59 chemicals evaluated in the SLERA—chromium and zinc

Selection of LOAELs

LOAELs are selected for use in the BERA risk analyses using a similar approach to that described for NOAELs, as follows:

4. **USEPA Eco-SSLs**
   - USEPA's Eco-SSL documents are used as the primary source for the wildlife LOAELs.
   - The LOAEL is one of the following:
     - A geometric mean LOAEL when a geometric mean NOAEL was selected for the SLERA
     - The LOAEL that matched the highest NOAEL that was lower than the lowest LOAELs for reproduction, growth, or survival selected for the SLERA
5. **Sample et al. (1996)**
   - In the absence of an Eco-SSL-based value, LOAELs are selected from those reported by Sample et al. (1996) for reproduction and growth, over mortality. A summary of the study reported by Sample et al., and selection of the LOAEL, is provided in the baseline tables (see Tables 11-10a and 11-10b).

6. **Other Literature Sources**

- In the absence of a LOAEL in Sample et al. (1996), other literature sources are used to select LOAELs. A summary of the study reported by the authors, and selection of the LOAEL, is provided in the baseline tables (see Tables 11-10a and 11-10b).

Notes:

- For the birds, 91% of the LOAELs are from the Eco-SSL documents or Sample et al. (1996), whereas for the mammals, 100% of the LOAELs are from these two sources (see Tables 11-10a and 11-10b, respectively).
- An Eco-SSL geometric mean LOAEL is only used in a few instances, as follows:
  - For birds, for 4 out of 11 chemicals evaluated in the baseline—cadmium, chromium, nickel, and zinc
  - For mammals, no LOAELs are based on geometric means; all are based on NOAEL-LOAEL pairs

Tissue

The effect thresholds used to evaluate potential risks to fish, crabs, bivalves, and polychaetes based on tissue concentrations were first presented to USEPA in the draft BERA report. As discussed in the *Baseline Ecological Risk Assessment Problem Formulation* (Anchor QEA 2014), the U.S. Army Corps of Engineers Environmental Residue-Effects Database (ERED; USACE 2013) is the primary source for selection of the effects thresholds. A review of the ERED sources, as well as USEPA sources (USEPA 2007b), was performed to identify any additional studies that could add to the body of information currently available for selecting measures of effect. The effect thresholds used in the SLERA are presented as no observed effect concentrations (NOECs) in Tables 5-3a and 5-3b (attached) for fish and invertebrates, respectively. Because no chemicals were identified as COPECs based on tissue concentrations using the NOEC selection process presented in the BERA report and described in the following, no lowest observed effect concentration (LOEC) tables were presented in the baseline analyses.

Selection of NOECs

In the absence of standard guidance on derivation or selection of NOECs, the SLERA developed an approach by selecting the minimum geometric mean NOEC calculated from ERED data (see Tables 5-3a and 5-3b). The following criteria were applied:

- Only NOECs for reproduction, growth, and mortality were selected for evaluation. LOECs were retained for reference.
- Only results presented as concentrations for whole body burdens were used.
- All life stages for each species were used.
- No duplicate results were presented.
- If the ERED notes stated there was a secondary exposure to a parasite or another chemical, the data were not used.
- For each endpoint (reproduction, growth, and mortality), a geometric mean NOEC was calculated, and the minimum of the three endpoints for a particular chemical was selected as the screening level NOEC.

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TABLES

Table 5-5a
Phase 2 Avian Screening Levels

Chemical	CAS RN	Source[1]	Test Species	NOAEL (mg/kg-day)	Selection Notes
Polycyclic Aromatic Hydrocarbons (PAHs)					
Acenaphthene	83-32-9	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Acenaphthylene	208-96-8	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Anthracene	120-12-7	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Benzo(a)anthracene	56-55-3	Beall 2007, benzo(a)anthracene	Bobwhite quail	0.65	This NOAEL is based on growth and survival of bobwhite quail; no effects were observed at any dose for the 60-day study.
Benzo(a)pyrene	50-32-8	Rigdon and Neal 1963	Chicken	33	This NOAEL is based on dietary exposure of benzo(a)pyrene to chickens where there was no effect on weight gain (growth).
Benzo(b)fluoranthene	205-99-2	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Benzo(g,h,i)perylene	191-24-2	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Benzo(k)fluoranthene	207-08-9	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Chrysene	218-01-9	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Dibenzo(a,h)anthracene	53-70-3	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Fluoranthene	206-44-0	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Fluorene	86-73-7	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Indeno(1,2,3-c,d)pyrene	193-39-5	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Pentachlorophenol	87-86-5	Hudson et al. 1984	Mallard	7.6	Derived from a lethal dose (LC50, 380 mg/kg) of pentachlorophenol to mallards. An uncertainty factor of 50 was used by Anchor QEA (2012) to derive the NOAEL (after Battelle 2007).
Phenanthrene	85-01-8	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Pyrene	129-00-0	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Total HPAH (10 of 17)	tPAH_17_HM	Benzo(a)pyrene	Chicken	33	See NOAEL for benzo(a)pyrene
Total LPAH (7 of 17)	tPAH_17_LM	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Total PAH (17)	tPAH_17	Patton and Dieter 1980	Mallard	32.5	This NOAEL is based on growth and survival of mallards exposed to two doses of a petroleum hydrocarbon mixture.
Pesticides					
4,4'-DDD (p,p'-DDD)	72-54-8	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
4,4'-DDE (p,p'-DDE)	72-55-9	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
4,4'-DDT (p,p'-DDT)	50-29-3	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
Sum DDD	Sum_DDD	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
Sum DDE	Sum_DDE	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
Sum DDT	Sum_DDT	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
Total DDT	tDDT	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[2] in the Eco-SSL document; growth is the endpoint.

Table 5-5a
Phase 2 Avian Screening Levels

Chemical	CAS RN	Source[1]	Test Species	NOAEL (mg/kg-day)	Selection Notes
2,4'-DDD (o,p'-DDD)	53-19-0	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
2,4'-DDT (o,p'-DDT)	789-02-6	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
2,4'-DDE (o,p'-DDE)	3424-82-6	Eco-SSL (USEPA 2007b), Table 5.2 and Figure 5.1	Chicken	0.227	See NOAEL for Total DDT
Aldrin	309-00-2	USACHPPM 2005a; Hall et al. 1971	Ring-necked pheasant	0.007	This NOAEL is based on growth of ring-necked pheasant. Growth of pheasants between 5 and 21 weeks of age was affected by a weekly aldrin dose of 1.0 and 1.5 mg/kg. A NOAEL of 0.07 mg/kg-day was calculated from a dose at 0.5 mg/kg (USACHPPM 2005a). A safety factor of 10 was applied by USACHPPM (2005a) due to the short duration of the test, 10 weeks.
Chlordane, alpha- (Chlordane, cis-)	5103-71-9	Sample et al. 1996; Stickel et al. 1983	Red-winged blackbird	2.14	See NOAEL for Total Chlordane
Total Chlordane	tChlordane	Sample et al. 1996; Stickel et al. 1983	Red-winged blackbird	2.14	This NOAEL is based on mortality of red-winged blackbirds. Mortality was observed among birds on diets containing 50 and 100 mg/kg chlordane. No adverse effects were observed for birds on diets containing 10 mg/kg chordane. Because the study considered exposure over 84 days, the 10 mg/kg dose was considered to be a chronic NOAEL and the 50 mg/kg dose was the chronic LOAEL (Sample et al. 1996). A NOAEL of 2.14 mg/kg-day was calculated (Sample et al. 1996).
Hexachlorocyclohexane (BHC), alpha-	319-84-6	USACHPPM 2009; Chakravarty and Lahiri 1986; Chakravarty et al. 1986	Mallard	0.571	See NOAEL for Hexachlorocyclohexane (BHC), gamma- (Lindane)
Hexachlorocyclohexane (BHC), beta-	319-85-7	USACHPPM 2009; Chakravarty and Lahiri 1986; Chakravarty et al. 1986	Mallard	0.571	See NOAEL for Hexachlorocyclohexane (BHC), gamma- (Lindane)
Hexachlorocyclohexane (BHC), delta-	319-86-8	USACHPPM 2009; Chakravarty and Lahiri 1986;	Mallard	0.571	See NOAEL for Hexachlorocyclohexane (BHC), gamma- (Lindane)
Hexachlorocyclohexane (BHC), gamma- (Lindane)	58-89-9	USACHPPM 2009; Chakravarty and Lahiri 1986; Chakravarty et al. 1986	Mallard	0.571	This NOAEL is based on reproduction of mallard ducks. Mallard ducks were exposed via gavage for 8 weeks at 20 mg/kg, either daily, three times/week, or twice/week (equivalent to doses of 20 mg/kg-day, 8.57 mg/kg-day, and 5.71 mg/kg-day). At 8.57 mg/kg-day, they displayed reduced eggshell thickness, laid fewer eggs and had longer time intervals between egg production (USACHPPM 2009). Because the study considered exposure during a critical lifestage, the 8.57 mg/kg-day was considered to be a chronic LOAEL and 5.71 mg/kg-day the NOAEL. However, for interspecific variability, a safety factor of 10 was applied by USACHPPM (2009).
Dieldrin	60-57-1	Eco-SSL (USEPA 2007c), Table 5.2 and Figure 5.1	Mallard	0.0709	This NOAEL is based on a NOAEL and LOAEL. This is the selected NOAEL[2] in the Eco-SSL document; growth is the endpoint.
Endosulfan, alpha- (I)	959-98-8	Sample et al. 1996; Abiola 1992	Gray partridge	10	This NOAEL is based on reproduction of gray partridge. No adverse effects were observed at any dose level. Because exposure occurred during reproduction, the maximum dose was considered a chronic NOAEL. The calculated NOAEL is 10 mg/kg-day (Sample et al. 1996).
Endosulfan, beta (II)	33213-65-9	Sample et al. 1996; Abiola 1992	Gray partridge	10	This NOAEL is based on reproduction of gray partridge. No adverse effects were observed at any dose level. Because exposure occurred during reproduction, the maximum dose was considered a chronic NOAEL. The calculated NOAEL is 10 mg/kg-day (Sample et al. 1996).

Table 5-5a
Phase 2 Avian Screening Levels

Chemical	CAS RN	Source[1]	Test Species	NOAEL (mg/kg-day)	Selection Notes
Endrin	72-20-8	Sample et al. 1996; Fleming et al. 1982	Screech owl	0.01	This NOAEL is based on reproduction of screech owls. Egg production and hatching success were reduced among owls fed 0.75 ppm endrin. Because the study considered exposure throughout a critical lifestage (reproduction), this dose was considered to be a chronic LOAEL. A chronic NOAEL was estimated by Sample et al. (1996) from the chronic LOAEL, by a LOAEL-NOAEL uncertainty factor of 10.
Heptachlor	76-44-8	Hill et al. 1975	Ring-necked pheasant	0.28	This NOAEL is derived from a lethal dose (LC50, 224 mg/kg) of heptachlor to ring-necked pheasants. An uncertainty factor of 800 was used by Anchor QEA (2012) to derive the NOAEL. This uncertainty factor is conservative to ensure that the predicted NOAEL is protective.
Heptachlor Epoxide	1024-57-3	Hill et al. 1975	Ring-necked pheasant	0.28	See NOAEL for Heptachlor
Hexachlorobenzene	118-74-1	Sample et al. 1996; Vos et al. 1971	Japanese quail	0.56	This NOAEL is based on reproduction of Japanese quail. Japanese quail were fed hexachlorobenzene (Benzene hexachloride BHC mixed isomers, Sample et al. 1996) for 90 days. Reduced reproduction and reduced volume of eggs were found in birds fed with 80 and 30 ppm. A NOAEL of 0.56 mg/kg-day was calculated from the group fed with 5 ppm (Sample et al. 1996).
Methoxychlor	72-43-5	Hudson et al. 1984	Multiple	80	This NOAEL is based on mortality (LD50s) of three species. All the same LD50, >2,000 mg/kg. An uncertainty factor of 25 was used by Anchor QEA (2012)-to derive the NOAEL (after Battelle 2007).
Mirex	2385-85-5	Hill et al. 1975	Ring-necked pheasant	3.3	Derived from a lethal dose (LC50, 1,540 mg/kg) of mirex to ring-necked pheasants. An uncertainty factor of 466 was used by Anchor QEA (2012) to derive the NOAEL (after Battelle 2007).
Polychlorinated Biphenyls (PCBs)					
Total PCB Congeners	tPCBCong	Sample et al. 1996; McLane and Hughes 1980; as Aroclor 1242	Screech owl	0.41	This NOAEL is based on a 2 generation (during a critical lifestage = chronic) single dose study on screech owl reproduction. Fertility and hatching success was not significantly reduced by 3 ppm Aroclor 1242 in the diet (equivalent to a NOAEL of 0.41 mg/kg-BW-day). Because the study considered exposure during reproduction, this dose was considered to be a chronic NOAEL (Sample et al. 1996).
Total PCB Congener TEQ 1998 (Avian)	TPCBCNGCPB98	Sample et al. 1996; McLane and Hughes 1980; as Aroclor 1242	Ring-necked pheasant	0.000014	This NOAEL is based on reduced egg production and significantly reduced hatchability in pheasant.
Metals					
Arsenic	7440-38-2	Eco-SSL (USEPA 2005a), Table 5.2 and Figure 5.1	Chicken	2.24	This NOAEL is the lowest NOAEL in the EcoSSL document for effects on all three endpoints, reproduction, growth, and survival.
Cadmium	7440-43-9	Eco-SSL (USEPA 2005b), Table 5.2 and Figure 5.1	Multiple	1.47	This NOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.
Chromium	16065-83-1	Eco-SSL (USEPA 2008), Table 5.2 and Figure 5.1	Multiple	2.66	This NOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.

Table 5-5a
Phase 2 Avian Screening Levels

Chemical	CAS RN	Source[1]	Test Species	NOAEL (mg/kg-day)	Selection Notes
Copper	7440-50-8	Eco-SSL (USEPA 2007d), Table 5.2 and Figure 5.1	Chicken	4.05	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[2] in the Eco-SSL document; reproduction is the endpoint.
Lead	7439-92-1	Eco-SSL (USEPA 2005c), Table 5.2 and Figure 5.1	Chicken	1.63	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[2] in the Eco-SSL document; reproduction is the endpoint.
Methyl mercury	22967-92-6	Sample et al. 1996 (Heinz 1979); methyl mercury	Mallard duck	0.0064	This NOAEL is for effects on reproduction. This a 3 generation (>1 yr and during a critical lifestage = chronic) single dose study with reproduction as the endpoint.
Nickel	7440-02-0	Eco-SSL (USEPA 2007e), Table 5.2 and Figure 5.1	Multiple	6.71	This NOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.
Selenium	7782-49-2	Eco-SSL (USEPA 2007f), Table 5.2 and Figure 5.1	Chicken	0.29	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[2] in the Eco-SSL document; survival is the endpoint.
Silver	7440-22-4	Eco-SSL (USEPA 2006), Table 5.2 and Figure 5.1	Multiple	2.02	This NOAEL is based on the lowest LOAEL divided by a safety factor of 10 by USEPA (2006) for growth and survival effects data for all listed species.
Zinc	7440-66-6	Eco-SSL (USEPA 2007g), Table 5.2 and Figure 5.1	Multiple	66.1	This NOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.
Dioxins and Furans					
Total Dioxin/Furan TEQ 1998 (Avian)	TDIOXFURB	Sample et al. 1996 (Nosek et al. 1992); 2,3,7,8-TCDD	Ring-necked pheasant	0.000014	This NOAEL is based on reduced egg production and significantly reduced hatchability in pheasant.
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	Sample et al. 1996 (Nosek et al. 1992); 2,3,7,8-TCDD	Ring-necked pheasant	0.000014	This NOAEL is based on reduced egg production and significantly reduced hatchability in pheasant.

Notes:
1 = References are provided in Table 5-5b.
2 = NOAEL value in Eco-SSL report is highest bounded NOAEL lower than the lowest bounded LOAEL value for reproduction, growth, or survival.

Acronyms:
CAS RN = Chemical Abstracts Service Registry Number
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = 2,4′ and 4,4′-DDD, -DDE, -DDT
Eco-SSL = Ecological Soil Screening Level
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LOAEL = lowest observed adverse effect level
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg-day = milligram per kilogram per day
NOAEL = no observed adverse effect level
TEQ = toxic equivalence quotient

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Polycyclic Aromatic Hydrocarbons (PAHs)								
Acenaphthene	83-32-9	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.3	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Acenaphthylene	208-96-8	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.3	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Anthracene	120-12-7	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.3	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Benzo(a)anthracene	56-55-3	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Benzo(a)pyrene	50-32-8	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Benzo(b)fluoranthene	205-99-2	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Benzo(g,h,i)perylene	191-24-2	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Benzo(k)fluoranthene	207-08-9	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Chrysene	218-01-9	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Dibenzo(a,h)anthracene	53-70-3	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Fluoranthene	206-44-0	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Fluorene	86-73-7	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.3	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Indeno(1,2,3-cd)pyrene	193-39-5	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Pentachlorophenol	87-86-5	Sample et al. 1996; Schwetz et al. 1978	pentachlorophenol	Rat	0.35	0.24	0.121	This NOAEL is based on growth and survival of rats. Survival and growth were significantly reduced (<20% of controls) among rats consuming the 30 ppm pentachlorophenol diet, no adverse effects were observed among rats on the 3 ppm diet. Because the study evaluated exposure during reproduction, the 3 ppm dose was considered to be a chronic NOAEL (0.24 mg/kg-day, Sample et al. 1996), and the 30 ppm dose was considered a chronic LOAEL (2.4 mg/kg-day).
Phenanthrene	85-01-8	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.3	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Pyrene	129-00-0	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Total HPAH (10 of 17)	tPAH_17_HM	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Total LPAH (7 of 17)	tPAH_17_LM	Eco-SSL (USEPA 2007h), Table 6.3 and Figure 6.1	1-naphthaleneacetic acid	Rat	0.247	65.6	30.26	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document,-growth is the endpoint.
Total PAH (17)	tPAH_17	Eco-SSL (USEPA 2007h), Table 6.4 and Figure 6.2	benzo(a)pyrene	Mouse	0.038	0.615	0.178	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, survival is the endpoint.
Pesticides								
4,4'-DDD	72-54-8	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
4,4'-DDE	72-55-9	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
4,4'-DDT	50-29-3	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
Sum DDD	Sum_DDD	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
Sum DDE	Sum_DDE	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
Sum DDT	Sum_DDT	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
Total DDT	tDDT	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, reproduction is the endpoint.
2,4'-DDD (o,p'-DDD)	53-19-0	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
2,4'-DDT (o,p'-DDT)	789-02-6	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT
2,4'-DDE (o,p'-DDE)	3424-82-6	Eco-SSL (USEPA 2007b), Table 6.2 and Figure 6.1	DDT	Rat	0.072	0.147	0.05	See NOAEL for Total DDT

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Aldrin	309-00-2	Sample et al. 1996; Treon and Cleveland 1955	aldrin	Rat	0.35	0.2	0.10	This NOAEL is based on reproduction of rats. In this three generation study of rats with reproduction as the endpoint, the number of litters and offspring mortality were not significantly affected at a 2.5 ppm dose, but were affected at a 12.5 ppm dose. The 2.5 ppm dose (0.2 mg/kg-day) was considered to be a chronic NOAEL and the 12.5 ppm dose was considered the chronic LOAEL (Sample et al. 1996).
alpha-Chlordane	5103-71-9	USACHPPM. 2005b; Narotsky and Kavlock 1995	chlordane	Rat[a]	0.35	2.1	1.06	See NOAEL for Total Chlordane
Total Chlordane	tChlordane	USACHPPM. 2005b; Narotsky and Kavlock 1995	chlordane	Rat[a]	0.35	2.1	1.06	This NOAEL is based on reproduction of rats. Rats had a significant decrease in the number of live pups from females exposed to 21 mg/kg/d chlordane and, in addition, decreased weight gain in chlordane-exposed females. As this was the highest dose administered, a NOAEL of 2.1 mg/kg-day was derived by USACHPPM (2005b) using a safety factor of 10.
Hexachlorocyclohexane (BHC), alpha-	319-84-6	Sample et al. 1996; Palmer et al. 1978.	BHC-gamma (Lindane)	Rat	0.35	8	4.03	BHC-gamma (Lindane)
Hexachlorocyclohexane (BHC), beta-	319-85-7	Sample et al. 1996; Van Velsen et al. 1986	BHC-beta	Rat	0.35	0.4	0.20	This NOAEL is based on reproduction of rats. A dietary dose of 250 ppm Beta-BHC (20 mg/kg-day) caused gonadal atrophy in both male and female rats. Because no significant effects were observed in groups consuming 50 ppm Beta-BHC (4 mg/kg-day) or less, this dose was considered to be a subchronic NOAEL; the 250 ppm dose was considered to be a subchronic LOAEL. A chronic NOAEL of 0.4 mg/kg-day was estimated by Sample et al. (1996) using a safety factor of 10.
Hexachlorocyclohexane (BHC), delta-	319-86-8	Sample et al. 1996; Palmer et al. 1978.	BHC-gamma (Lindane)	Rat	0.35	8	4.03	See NOAEL for BHC-gamma (Lindane)
Hexachlorocyclohexane (BHC), gamma-(Lindane)	58-89-9	Sample et al. 1996; Palmer et al. 1978.	BHC-gamma (Lindane)	Rat	0.35	8	4.03	This NOAEL is based on reproduction of rats. In this three generation study of rats with reproduction as the endpoint, significant effects were not observed at any dose level; therefore, the 100 ppm dietary exposure (8 mg/kg-day) was considered to be a chronic NOAEL (Sample et al. 1996).
Dieldrin	60-57-1	Eco-SSL (USEPA 2007c), Table 6.2 and Figure 6.1	dieldrin	Rat	0.217	0.015	0.01	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, reproduction is the endpoint.

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Endosulfan, alpha- (I)	959-98-8	Sample et al. 1996; Dikshith et al. 1984	endosulfan	Rat	0.35	0.15	0.08	This NOAEL is based on reproduction of rats. Male and female rats were dosed for 30 days at three dose levels. After mating dosed males and females, no adverse effects on reproduction were observed at any dose level. The highest dose, 1.5 mg/kg-day was considered a subchronic NOAEL. A chronic NOAEL of 0.15 mg/kg-day was estimated by USEPA (2007c) by using a safety factor of 10.
Endosulfan, beta (II)	33213-65-9	Sample et al. 1996; Dikshith et al. 1984	endosulfan	Rat	0.35	0.15	0.08	See NOAEL for Endosulfan
Endrin	72-20-8	Sample et al. 1996; Good and Ware 1969	endrin	Mouse	0.03	0.092	0.03	This NOAEL is based on reproduction of mice. Significant reproductive effects were observed among mice fed a diet with 5 ppm (0.92 mg/kg-day) endrin. Because the study considered exposure during a critical lifestage, this dose was considered to be a chronic LOAEL. A chronic NOAEL of 0.092 mg/kg-day was estimated by Sample et al. (1996) by using a safety factor of 10.
Heptachlor	76-44-8	ATSDR 2007	heptachor	Mouse[a]	0.03	0.9	0.25	This NOAEL is based on reproduction of mice, 100% infertility was observed in mice fed 9.3 mg/kg-day heptachlor for 10 weeks. As this was a LOAEL, a NOAEL of 0.9 mg/kg-day was estimated by ATSDR (2007) using a safety factor of 10.
Heptachlor epoxide	1024-57-3	ATSDR 2007	heptachor	Mouse[a]	0.03	0.9	0.25	See NOAEL for Heptachlor
Hexachlorobenzene	118-74-1	ATSDR 2002; Gralla et al. 1977	hexachlorobenzene	Beagle dog	10	1.0	1.16	This NOAEL is based on growth of beagles. Effects on growth for beagles fed hexachlobenzene for a year were observed a 11 mg/kg-day. The NOAEL for the study was 1.0 mg/kg-day.
Methoxychlor	72-43-5	Sample et al. 1996; Gray et al. 1988	methoxychlor	Rat	0.35	4	2.01	This NOAEL is based on reproduction of rats. Fertility and litter size was reduced for rats fed diets containing 100 or 200 ppm methoxychlor. Significant effects on reproduction were not observed at a 50 ppm dose. As the study evaluated exposure during reproduction, the 50 ppm dose (4 mg/kg-day) was considered a chronic NOAEL (the 100 ppm dose (8 mg/kg-day) was considered the chronic LOAEL (Sample et al. 1996).

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Mirex	2385-85-5	USEPA 2011	mirex	Rat	0.35	0.7	0.35	This NOAEL is based on growth of rats. Male rats in 1.8 and 3.8 mg/kg-day dose groups gained less weight than controls during the first 70 weeks of exposure, and lost weight between 70 and 104 weeks of exposure. Body weights after 104 weeks of exposure were 11% (1.8 mg/kg-day) and 18% (3.8 mg/kg-day) less than controls. The NOAEL for effects on growth was estimated by USEPA (2011) to be at the 0.7 mg/kg-day dose.
Polychlorinated Biphenyls (PCBs)								
Total PCB congeners	tPCBCong	Sample et al. 1996; Barsotti et al. 1976	Aroclor 1248	Rhesus monkey	5	0.01	0.0098	This NOAEL is based on reproduction of monkeys. This NOAEL is based on a study where pregnancy and live birth rates were reduced by both dose levels used in the study. Because the study considered exposure over 14 months including critical lifestages (reproduction), the 2.5 ppm dose (0.1 mg/kg-day) was considered to be a chronic LOAEL. A chronic NOAEL of 0.01 mg/kg-day was estimated by Sample et al. (1996) by using a safety factor of 10.
Total PCB Congener TEQ 1998 (Mammal)	tPCBCongCPM	Sample et al. 1996; Murray et al. 1979.	2,3,7,8-TCDD	Rat	0.35	0.000001	0.00000050	This NOAEL is based on reproduction of rats. The purpose of the study was to evaluate the effects of TCDD on the reproductive capacity of rats given the compound continuously throughout three generations. Because this a three generation study, it covers the sensitivity of both the adults and their offspring, thereby allowing a good evaluation of the sensitivity of this species to dioxin and dioxin-like PCBs.
Metals								
Arsenic	7440-38-2	Eco-SSL (USEPA 2005a), Table 6.2 and Figure 6.1	sodium arsenite	Dog	10.1	1.04	1.21	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, growth is the endpoint.
Cadmium	7440-43-9	Eco-SSL (USEPA 2005b), Table 6.2 and Figure 6.1	cadmium acetate	Rat	0.43	0.77	0.41	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, growth is the endpoint.

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Chromium	7440-47-3	Eco-SSL (USEPA 2008), Table 6.3 and Figure 6.1	multiple forms	Multiple	N/A	2.4	2.4	This is the selected NOAEL in the Eco-SSL document based on geometric mean of growth and reproduction effects data for multiple species.
Copper	7440-50-8	Eco-SSL (USEPA 2007d), Table 6.2 and Figure 6.1	copper sulfate pentahydrate	Pig	100	5.6	11.59	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, growth and survival are the endpoints.
Lead	7439-92-1	Eco-SSL (USEPA 2005c), Table 6.2 and Figure 6.1	lead acetate	Rat	0.3	4.7	2.28	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, growth is the endpoint.
Methyl mercury	22967-92-6	Sample et al. 1996; Wobeser et al. 1976	methyl mercury chloride	Mink	1	0.0150	0.0098	This NOAEL is based on growth and mortality of mink. Mercury doses of 1.8 ppm or greater produced effects on mortality and growth. The study duration was < 14 weeks (93 days). Because significant effects were not observed at the 1.1 ppm (0.15 mg/kg-day) mercury dose level, and the duration was <1 year, this dose was considered to be a subchronic NOAEL. A chronic NOAEL of 0.015 mg/kg-day was estimated by Sample et al. (1996) by using a safety factor of 10 to the subchronic NOAEL.
Nickel	7440-02-0	Eco-SSL (USEPA 2007e), Table 6.2 and Figure 6.1	nickelous chloride	Mouse	0.03	1.70	0.4630	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, reproduction is the endpoint.
Selenium	7782-49-2	Eco-SSL (USEPA 2007f), Table 6.2 and Figure 6.1	sodium selenite	Pig	17.8	0.143	0.19	This NOAEL is based on a NOAEL and LOAEL pair. This is the selected NOAEL[b] in the Eco-SSL document, growth is the endpoint.
Silver	7440-22-4	Eco-SSL (USEPA 2006), Table 6.2 and Figure 6.1	silver acetate	Pig	8.86	6.02	6.80	This NOAEL is based on the lowest LOAEL divided by 10 by USEPA (2006) for growth and survival effects data for all listed species, growth is the endpoint.
Zinc	7440-66-6	Eco-SSL (USEPA 2007g), Table 6.2 and Figure 6.1	multiple forms	Multiple	N/A	75.4	75.4	This is the selected NOAEL in the Eco-SSL document based on geometric mean of growth and reproduction effects data for multiple species.

Table 5-5b
Phase 2 Mammalian Screening Levels

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight	Test Species NOAEL (mg/kg-day)	Raccoon NOAEL (mg/kg-day)	Selection Notes
Dioxins and Furans								
Total Dioxin/Furan TEQ 2005 (Mammal)	TDIOXFURM	Sample et al. 1996; Murray et al. 1979	2,3,7,8-TCDD	Rat	0.35	0.000001	0.00000050	This NOAEL is based on reproduction of rats. The purpose of the study was to evaluate the effects of TCDD on the reproductive capacity of rats given the compound continuously throughout three generations. Because this a three generation study, it covers the sensitivity of both the adults and their offspring, thereby allowing a good evaluation of the sensitivity of this species to dioxin and dioxin-like PCBs.
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746-01-6	Sample et al. 1996; Murray et al. 1979	2,3,7,8-TCDD	Rat	0.35	0.000001	0.00000050	This NOAEL is based on reproduction of rats. The purpose of the study was to evaluate the effects of TCDD on the reproductive capacity of rats given the compound continuously throughout three generations. Because this a three generation study, it covers the sensitivity of both the adults and their offspring, thereby allowing a good evaluation of the sensitivity of this species to dioxin and dioxin-like PCBs.

Table 5-5b
Phase 2 Mammalian Screening Levels

Notes:
a = Assumed body weight from Sample et al. 1996.
b = NOAEL value in Eco-SSL report is highest bounded NOAEL lower than the lowest bounded LOAEL value for reproduction, growth or survival.

Acronyms:
CAS RN = Chemical Abstracts Service Registry Number
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = 2,4′ and 4,4′-DDD, -DDE, -DDT
Eco-SSL = Ecological Soil Screening Level
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg-day = milligram per kilogram per day
NA = not available
NOAEL = no observed adverse effect level
TEQ = toxic equivalence quotient

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Table 5-5b
Phase 2 Mammalian Screening Levels

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Table 11-10a
Phase 2 Baseline Avian Toxicity Reference Values

Chemical	CAS RN	Source	Test Species	LOAEL (mg/kg-day)	Selection Notes
PCB Congeners					
Total PCB Congeners	tPCBCong	Britton and Huston (1973)	Chicken	0.58	This LOAEL is based on reduced egg hatchability in chickens.
Total PCB Congener TEQ 1998 (Avian)	TPCBCNGCPB98	Sample et al. 1996 (Nosek et al. 1992); 2,3,7,8-TCDD	Ring-necked pheasant	0.00014	This LOAEL is based on reduced egg production and significantly reduced hatchability in pheasant.
Metals					
Arsenic	7440-38-2	Eco-SSL (USEPA 2005a)	Chicken	4.51	This LOAEL is from a geometric mean of three growth studies in the Eco-SSL document.
Cadmium	7440-43-9	Eco-SSL (USEPA 2005b)	Multiple	6.34	This LOAEL is based on a geometric mean of growth and reproduction effects data for multiple species in the Eco-SSL document.
Chromium	16065-83-1	Eco-SSL (USEPA 2008)	Multiple	15.6	This LOAEL is based on a geometric mean of growth and reproduction effects data for multiple species in the Eco-SSL document.
Copper	7440-50-8	Eco-SSL (USEPA 2007a)	Chicken	12.1	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[a] in the Eco-SSL document; growth and survival are the endpoints.
Lead	7439-92-1	Eco-SSL (USEPA 2005c)	Chicken	3.26	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[a] in the Eco-SSL document; reproduction is the endpoint.
Nickel	7440-02-0	Eco-SSL (USEPA 2007b)	Multiple	18.5	This LOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.
Selenium	7782-49-2	Eco-SSL (USEPA 2007c)	Chicken	0.579	The LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[a] in the Eco-SSL document; survival is the endpoint.
Zinc	7440-66-6	Eco-SSL (USEPA 2007d)	Multiple	171	This LOAEL is based on a geometric mean of growth and reproduction effects data for multiple species.
Dioxins/Furans					
Total Dioxin/Furan TEQ 1998 (Avian)	TDIOXFURB	Sample et al. 1996; (Nosek et al. 1992); 2,3,7,8-TCDD	Ring-necked pheasant	1.40E-04	This LOAEL is based on reduced egg production and significantly reduced hatchability in pheasant.

Table 11-10a
Phase 2 Baseline Avian Toxicity Reference Values

Note:
a = NOAEL value in the Eco-SSL report is highest bounded NOAEL lower than the lowest bounded LOAEL value for reproduction, growth, or survival.

Acronyms:
CAS RN = Chemical Abstracts Service Registry Number
Eco-SSL = Ecological Soil Screening Level
LOAEL = lowest observed adverse effect level
mg/kg-day = milligram per kilogram per day
NOAEL = no observed adverse effect level
PCB = polychlorinated biphenyl
TEQ = toxic equivalence quotient
TRV = Toxicity Reference Value
USEPA = U.S. Environmental Protection Agency

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Table 11-10b
Phase 2 Baseline Mammalian Toxicity Reference Values

Chemical	CAS RN	Source	Form/Surrogate Analyte	Test Species	Test Species Body Weight (kg)	Test Species LOAEL (mg/kg-day)	Raccoon LOAEL (mg/kg-day)	Selection Notes
Semivolatiles								
Pyrene	129-00-0	Eco-SSL (USEPA 2007d)	Benzo(a)pyrene	Mouse	0.038	3.07	0.887	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; survival is the endpoint.
Total HPAH (10 of 17)	tPAH_17_HM	Eco-SSL (USEPA 2007d)	Benzo(a)pyrene	Mouse	0.038	3.07	0.887	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; survival is the endpoint.
Total PAH (17)	tPAH_17	Eco-SSL (USEPA 2007d)	Benzo(a)pyrene	Mouse	0.038	3.07	0.887	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; survival is the endpoint.
PCB Congeners								
Total PCB congeners	tPCBCong	Sample et al. 1996; Barsotti et al. 1976	Aroclor 1248	Rhesus monkey	5	0.10	0.098	This LOAEL is based on a study where pregnancy and live birth rates were reduced by both dose levels in the 14-month study (as cited in Sample et al. 1996).
Total PCB Congener TEQ 1998 (Mammal)	tPCBCongCPM	Sample et al. 1996 (Murray et al. 1979)	2,3,7,8-TCDD	Rat	0.35	1.00E-05	5.033E-06	This LOAEL is based on a study where the NOAEL and LOAEL are for effects on reproduction. The purpose of the study was to evaluate the effects of TCDD on the reproductive capacity of rats given the compound continuously throughout three generations. Furthermore, as this a three generation study, it covers the sensitivity of both the adults and their offspring, thereby allowing a good evaluation of the sensitivity of this species to dioxin and dioxin-like PCBs.
Metals								
Arsenic	7440-38-2	Eco-SSL (USEPA 2005a)	Sodium arsenite	Dog	10.1	1.66	1.937	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; growth is the endpoint.
Copper	7440-50-8	Eco-SSL (USEPA 2007a)	Copper sulfate pentahydrate	Pig	100	9.34	19.328	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; growth and survival are the endpoints.
Lead	7439-92-1	Eco-SSL (USEPA 2005b)	Lead acetate	Rat	0.3	8.9	4.310	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; growth is the endpoint.
Nickel	7440-02-0	Eco-SSL (USEPA 2007b)	Nickelous chloride	Mouse	0.025	3.4	0.885	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; reproduction is the endpoint.
Selenium	7782-49-2	Eco-SSL (USEPA 2007c)	Sodium selenite	Pig	17.8	0.215	0.289	This LOAEL is based on a NOAEL and LOAEL pair. This is the paired LOAEL for the selected NOAEL[b] in the Eco-SSL document; reproduction is the endpoint.
Dioxins/Furans								
Total Dioxin/Furan TEQ 2005 (Mammal)	TDIOXFURM	Sample et al. 1996 (Murray et al. 1979)	2,3,7,8-TCDD	Rat	0.35	1.00E-05	5.033E-06	This LOAEL is based on a study where the NOAEL and LOAEL are for effects on reproduction. The purpose of the study was to evaluate the effects of TCDD on the reproductive capacity of rats given the compound continuously throughout three generations. Furthermore, as this a three generation study, it covers the sensitivity of both the adults and their offspring, thereby allowing a good evaluation of the sensitivity of this species to dioxin and dioxin-like PCBs.

Table 11-10b
Phase 2 Baseline Mammalian Toxicity Reference Values

Notes:
a= No body weight correction used for the receptor.
b = NOAEL value in Eco-SSL report is highest bounded NOAEL lower than the lowest bounded LOAEL value for reproduction, growth or survival.

Acronyms:
CAS RN = Chemical Abstracts Service Registry Number
Eco-SSL = Ecological Soil Screening Level
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
kg = kilogram
LOAEL = lowest observed adverse effect level
mg/kg-day = milligram per kilogram per day
NOAEL = no observed adverse effect level
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEQ = toxic equivalence quotient
USEPA = U.S. Environmental Protection Agency

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USEPA (U.S. Environmental Protection Agency), 2005b. *Ecological Soil Screening Levels for Lead* . OSWER Directive 9285.7-69. Office of Solid Waste and Emergency Response, Washington, DC. March 2005.
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Table 5-3a
Phase 2 SLERA Fish Screening Levels

Chemical Group	Chemical	Units (Wet Weight)	Growth NOEC		Reproduction NOEC		Mortality NOEC		Minimum of the Geomeans	Reference
			Count	Geomean	Count	Geomean	Count	Geomean		
Metal	Arsenic	mg/kg	4	7.67	1	--	8	4.12	4.12	USACE 2013
Metal	Cadmium	mg/kg	12	1.18	9	31.34	21	1.11	1.11	USACE 2013
Metal	Chromium	mg/kg	3	0.62	--	--	1	--	0.62	USACE 2013
Metal	Copper	mg/kg	7	5.14	--	--	7	3.98	3.98	USACE 2013
Metal	Lead	mg/kg	2	3.20	--	--	1	--	3.20	USACE 2013
Metal	Methyl mercury	mg/kg	2	2.63	3	5.68	2	10.17	2.63	USACE 2013
Metal	Nickel	mg/kg	--	--	--	--	--	--	--	USACE 2013
Metal	Selenium	mg/kg	17	0.78	6	1.96	17	1.63	0.78	USACE 2013
Metal	Silver	mg/kg	2	0.08	2	0.39	3	0.08	0.08	USACE 2013
Metal	Zinc	mg/kg	6	59.21	1	--	5	141.25	59.21	USACE 2013
PCB	Total PCB TEQ	ng/kg	22	22.10	9	29.31	27	14.87	14.87	USEPA 2007
PCB	Total PCB	µg/kg	10	47616	6	114484	18	29348	29348	USEPA 2007
Dioxin/Furan	2,3,7,8-TCDD	µg/kg	8	0.79	1	--	14	1.47	0.79	USACE 2013
Dioxin/Furan	2,3,7,8-TCDF	µg/kg	3	0.36	--	--	--	--	0.36	USACE 2013
Pesticide	4,4'-DDD	mg/kg	1	--	--	--	2	13.98	13.98	USACE 2013
Pesticide	4,4'-DDE	mg/kg	2	3.66	1	--	2	27.39	3.66	USACE 2013
Pesticide	4,4'-DDT	mg/kg	7	13.12	2	15.22	10	5.53	5.53	USACE 2013
Pesticide	Aldrin	mg/kg	--	--	--	--	1	--	0.157[a]	USACE 2013
Pesticide	Chlordane	mg/kg	1	--	1	--	2	10.96	10.96	USACE 2013
Pesticide	Dieldrin	mg/kg	--	--	2	0.52	4	2.50	0.52	USACE 2013
Pesticide	Endosulfan	mg/kg	--	--	--	--	1	--	0.195[a]	USACE 2013
Pesticide	Endrin	mg/kg	3	0.32	2	0.42	11	0.28	0.28	USACE 2013
Pesticide	Heptachlor	mg/kg	1	--	--	--	3	0.65	0.65	USACE 2013
Pesticide	Heptachlor Epoxide	mg/kg	1	--	--	--	4	0.22	0.22	USACE 2013
Pesticide	Methoxychlor	mg/kg	--	--	--	--	4	0.18	0.18	USACE 2013
Pesticide	Mirex	mg/kg	5	7.49	4	13.63	13	10.68	7.49	USACE 2013
PAH	Acenaphthene	mg/kg	--	--	--	--	1	--	3.5[a]	USACE 2013
PAH	Benzo(a)pyrene	mg/kg	--	--	1	--	--	--	12.34[b]	USACE 2013
PAH	Phenanthrene	mg/kg	--	--	--	--	5	42.25	42.25	USACE 2013

Notes:
a = A geometric mean could not be calculated because there was only one NOEC available; in this case, for mortality.
b = A geometric mean could not be calculated because there was only one NOEC available; in this case, for reproduction.
-- = no data

Acronyms:
µg/kg = microgram per kilogram
2,3,7,8 TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8 TCDF = 2,3,7,8-Tetrachlorodibenzofuran
geomean = geometric mean
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
NOEC = no observable effort concentrations
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
TEQ = toxic equivalence quotient

References:
USEPA (U.S. Environmental Protection Agency), 2007. PCB Residue Effects (PCBRes) Users Guide. Version 1.0. Prepared for U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory , Mid-Continent Ecology Division (MED). Prepared by Computer Science Corporation. Contract 68 W-02 032, Task 5003 and 5004. October 2007. Accessed August 2013. Available from: http://www.epa.gov/med/Prods_Pubs/pcbres.htm.
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Table 5-3b
Phase 2 SLERA Invertebrate Screening Levels

Chemical Group	Chemical	Units (Wet Weight)	Growth NOEC		Reproduction NOEC		Mortality NOEC		Minimum of the Geomeans	Reference
			Count	Geomean	Count	Geomean	Count	Geomean		
Metal	Arsenic	mg/kg	5	2.87	--	--	12	5.67	2.87	USACE 2013
Metal	Cadmium	mg/kg	11	15.29	11	15.39	44	18.81	15.29	USACE 2013
Metal	Chromium	mg/kg	--	--	3	6.04	--	--	6.04	USACE 2013
Metal	Copper	mg/kg	8	19.76	4	18.53	18	22.51	18.53	USACE 2013
Metal	Lead	mg/kg	4	44.70	1	--	9	17.27	17.27	USACE 2013
Metal	Methyl mercury	mg/kg	--	--	--	--	1	--	36.75[a]	USACE 2013
Metal	Nickel	mg/kg	1	--	--	--	2	33.85	33.85	USACE 2013
Metal	Selenium	mg/kg	2	9.28	1	--	1	--	9.28	USACE 2013
Metal	Silver	mg/kg	2	19.80	1	--	1	--	19.80	USACE 2013
Metal	Zinc	mg/kg	3	64.73	1	--	12	37.98	37.98	USACE 2013
PCB	Total PCBs	mg/kg	3	6.36	--	--	11	31.01	6.36	USACE 2013
Dioxin/Furan	2,3,7,8-TCDD	µg/kg	1	--	--	--	9	153.05	153.05	USACE 2013
Pesticide	4,4'-DDD	mg/kg	--	--	--	--	--	--	--	--
Pesticide	4,4'-DDE	mg/kg	--	--	--	--	--	--	--	--
Pesticide	4,4'-DDT	mg/kg	1	--	--	--	6	1.62	1.62	USACE 2013
Pesticide	Aldrin	mg/kg	--	--	--	--	3	0.18	0.18	USACE 2013
Pesticide	Chlordane	mg/kg	1	--	--	--	2	1.85	1.85	USACE 2013
Pesticide	Dieldrin	mg/kg	--	--	--	--	2	44.61	44.61	USACE 2013
Pesticide	Endosulfan	mg/kg	--	--	--	--	3	3.31	3.31	USACE 2013
Pesticide	Endrin	mg/kg	3	2.61	2	0.11	6	0.55	0.11	USACE 2013
Pesticide	Heptachlor	mg/kg	1	--	--	--	2	0.02	0.02	USACE 2013
Pesticide	Heptachlor Epoxide	mg/kg	1	--	--	--	2	0.12	0.12	USACE 2013
Pesticide	Methoxychlor	mg/kg	--	--	--	--	5	0.71	0.71	USACE 2013
Pesticide	Mirex	mg/kg	4	0.04	--	--	8	0.27	0.04	USACE 2013

Notes:
a = A geometric mean could not be calculated because only one NOEC was available; in this case, for mortality.
-- = no data
2,3,7,8 TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
µg/kg = microgram per kilogram
geomean = geometric mean
mg/kg = milligram per kilogram
NOEC = no observable effort concentrations
PCB = polychlorinated biphenyl

Reference:
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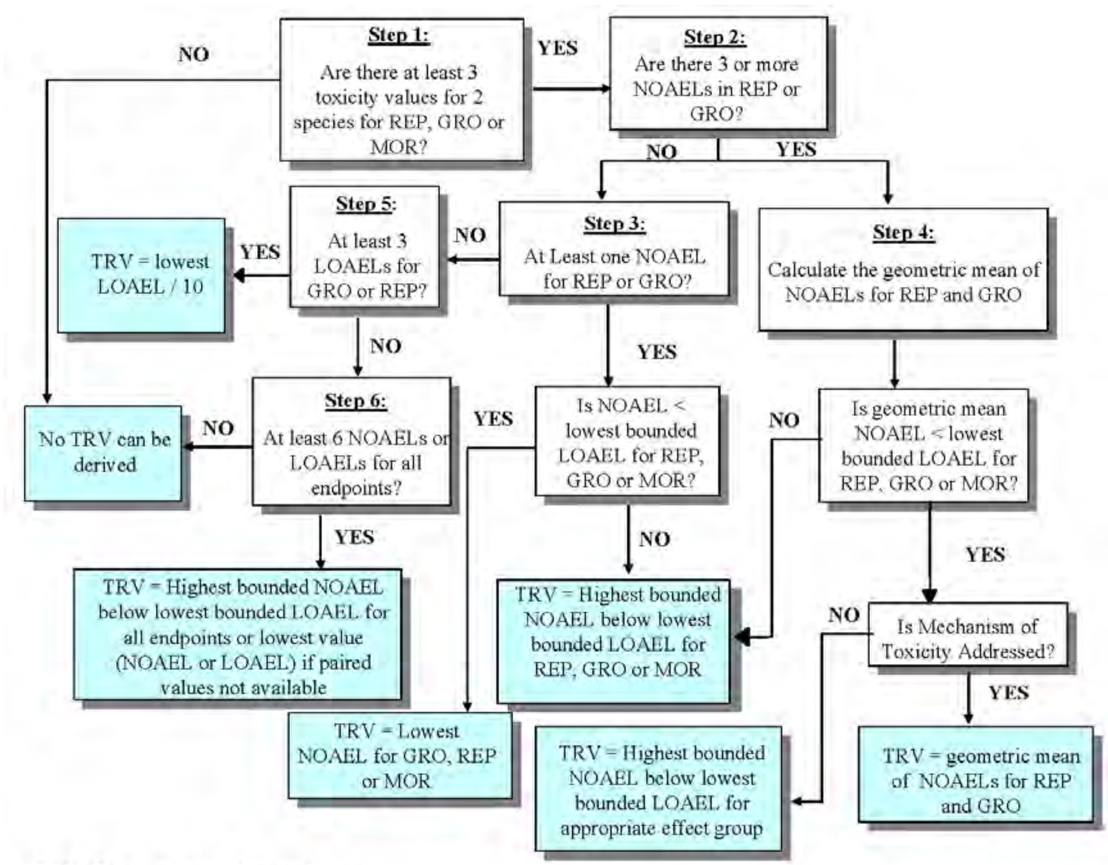
TRV DERIVATION PROCEDURE FLOW CHART



TRV Derivation Procedure

Source: U.S. Environmental Protection Agency, 2007. *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Standard Operating Procedure (SOP) 4: Derivation of Wildlife Toxicity Reference Value (TRV)* (Attachment 4-5). OSWER Directive 92857-55. June 2007.

February 2, 2017: ***Benthic Macroinvertebrate Risk Assessment Summary*****. Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.**

Newtown Creek Baseline Ecological Risk Assessment
Benthic Macroinvertebrate Risk Assessment Summary

The following provides a summary of the process used in the Newtown Creek *Baseline Ecological Risk Assessment* (BERA) to evaluate risks to benthic macroinvertebrates. The process is summarized in two flow charts (see attached as Part 1 and Part 2), and described in the following sections.

Part 1

Overall Approach

The overall approach to the benthic (macroinvertebrate) risk assessment uses a sediment quality triad (SQT) consisting of chemistry, toxicity testing, and a benthic community evaluation. For the chemistry component of the SQT, the BERA uses bulk sediment chemistry, and to evaluate chemical bioavailability, bulk sediment acid volatile sulfide (AVS) and simultaneously extracted metals (SEM), and porewater chemistry. The use of AVS and SEM and porewater chemistry to evaluate bioavailability rather than rely on bulk sediment chemistry is consistent with the state-of-the-science to assess risks to benthic organisms. For the divalent metals copper, cadmium, lead, nickel, and zinc, bulk sediment AVS and SEM are often used to predict toxicity to benthic macroinvertebrates (Di Toro et al. 1992; Ankley et al. 1996; Berry et al. 1996; USEPA 2005). The AVS present in sediment reacts with these metals forming insoluble metal sulfides, thereby reducing bioavailability. While the use of bulk sediment chemistry is useful in the screening of chemicals for potential risk to benthic macroinvertebrates, it is well established in the scientific literature that sediment porewater is the primary route of exposure to benthic macroinvertebrates. Because of this, U.S. Environmental Protection Agency (USEPA) scientists have developed guidance that recognizes the limits of bulk sediment chemistry-based evaluations and recommends the use of porewater-based evaluations (USEPA 2003, 2005, 2012; Burgess 2009; Burgess et al. 2013). When measured porewater chemical concentrations are used in conjunction with sediment toxicity tests, the data provide a more definitive identification of contaminants contributing to benthic macroinvertebrate risk, and therefore, a more definitive dataset upon which to make remedial decisions. It is for these reasons that these techniques are used in the BERA.

In commenting on the benthic macroinvertebrate risk assessment, USEPA requested that the BERA discuss the relationship between porewater and bulk sediment chemistry to support the findings of the sediment toxicity tests, and that the discussion of confounding factors be confined to the uncertainty section of the BERA report rather than in the main body of the report. Therefore, the following discusses the chemistry and toxicity components of the

SQT, not the benthic community component, which appears to respond most strongly to dissolved oxygen concentrations in the water column.

Chemistry

Bulk sediment chemistry was first evaluated in the Screening Level Ecological Risk Assessment (**SLERA; Section 5 of the BERA report),** with a screening of all sediment chemicals (Remedial Investigation Phase 1 analytes) against sediment screening levels (SLs), using a hierarchy for selection of the SLs provided by USEPA. The results of the SLERA (see Table 5-7) identified bulk sediment contaminants of potential ecological concern (COPECs) consisting of the following:

- Thirteen metals: antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, tin, and zinc
- One conventional: cyanide
- Two volatile organic compounds (VOCs): isopropylbenzene and carbon disulfide
- Two semivolatile organic compounds (SVOCs): di-n-octyl phthalate and bis(2-ethylhexyl)phthalate (BEHP)
- Individual polycyclic aromatic hydrocarbons (PAHs), low-molecular-weight polycyclic aromatic hydrocarbons (LPAHs), high-molecular-weight polycyclic aromatic hydrocarbons (HPAHs), and total PAH (17) (TPAH [17])
- Nine pesticides: aldrin, dieldrin, endrin, chlordane, endosulfan sulfate, heptachlor epoxide, 4,4-DDD, 4,4-DDE, and 4,4-DDT
- Total polychlorinated biphenyl (TPCB) congeners

Most of these COPECs were evaluated further in the **baseline analyses for the benthic risk assessment (Section 8 of the BERA report)**. Cyanide was not evaluated further because of uncertainties with the SL (see Section 5.4.2), and the two VOCs were not evaluated further because, as discussed in the *Phase 2 Remedial Investigation Work Plan – Volume 1*, Phase 2 sediment samples were not analyzed for VOCs due to low or non-detects in Phase 1. Therefore, the two VOCs were not included in the sediment or porewater analyte list for the SQT samples.

To evaluate the bioavailability of the bulk sediment COPECs, the PAHs, TPCB, pesticides (including the 9 identified as COPECs), and metals (including the 13 identified as COPECs), were measured in porewater collected from test chambers run alongside the sediment toxicity test chambers. The two SVOC COPECs were not measured in porewater, but were addressed in Section 8.3.3.6 of the BERA report. As discussed, these higher molecular weight phthalates are unlikely to be bioavailable, based on equilibrium partitioning theory, due to very low solubility. The baseline analyses also included measurement of bulk sediment AVS and SEM to evaluate the bioavailability of cadmium, copper, lead, zinc, and nickel.

Results of the baseline analyses show:

- Bulk sediment ΣSEM – AVS measurements were less than zero indicating a lack of bioavailability of copper, cadmium, lead, nickel, and zinc based on bulk sediment concentrations (see Figure E-1).
- Porewater COPECs with toxic units (TUs) greater than 1 were (see Table 8-4):
  - TPAH (34) and individual PAHs
  - Total SEM, copper, lead, and zinc
- All other sediment COPECs identified in the SLERA (see above) and measured in porewater were either non-detect or had porewater TUs less than 1

Toxicity

In the baseline analyses for the **benthic risk assessment (Section 8 of the BERA report)**, sediment bioassays were conducted to evaluate sediment toxicity. The bioassays were conducted using the amphipod, *Leptocheirus plumulosus*, and consisted of a 10-day acute test with survival as the endpoint, and a 28-day chronic test with survival, reproduction (per surviving amphipod and per surviving female), and growth (biomass and weight), as the endpoints.

The sediment toxicity tests were conducted for both the Study Area and each of the four Phase 2 reference areas. The results of the toxicity tests for the reference areas were used to develop a reference envelope, against which the results of the Study Area toxicity tests were compared (see Table 8-7 and Figures 8-13 to 8-18). The results of the toxicity tests and porewater chemistry were combined to develop porewater-based concentration-response relationships for those COPECs with porewater TUs greater than 1 (see Figures 8-19a through 8-24a). The metals and PAHs are evaluated as groups because it is assumed the toxicity is additive (USEPA 2003; USEPA 2005).

Part 2

The stations used to develop the porewater-based concentration-response relationships fell into the following two categories:

1) **Stations for which the toxicity test results are consistent with expected porewater-based concentration-response relationships.** That is, the toxicity tests showed an adverse response (e.g., low survival), and porewater COPEC TUs were greater than 1.
2) **Stations for which the toxicity test results are not consistent with expected porewater-based concentration-response relationships.** That is, for nine stations, the toxicity tests showed an adverse response (e.g., low survival), but porewater COPEC concentrations were low (resulting in TUs below 1 with a few between 1 and 2).

The nine stations are NC065, DK037, DK040, MC005, MC017, EB006, EB036, WE012, and WE014. Given the spatial location of these stations, factors associated with large combined sewer overflow (CSO) and municipal separate storm sewer system (MS4) discharges were a plausible explanation (e.g., see Figure 8-13). As presented in the BERA, because toxicity at these stations may be influenced by factors other than exposure to porewater COPECs, if these nine stations are not included, the porewater-based concentration-response relationships are improved (see Figures 8-19b through 8-24b).

To evaluate which of the toxicity tests (10-day versus 28-day) is a better predictor of toxicity for a complex site such as Newtown Creek, a contingency table analysis was conducted with and without the nine stations to assess uncertainty around predictions of toxicity. USEPA (2002) describes the use of contingency tables to evaluate multiple lines of evidence in sediment risk assessment, including evaluating outcomes expressed as true, a false negative, or a false positive. In the BERA, a false positive is defined as when endpoint performance is below the reference envelope and the TU is less than 1. A false negative is defined as when endpoint performance is within the reference envelope but the TU is greater than 1.

This analysis provided the following two important findings:

1) The false positive error rates improved (were lower) when the nine stations were removed, showing that these stations contribute to "errors" in the porewater concentration-response relationship.
2) For the 28-day test, the false positive error rates improved to less than 1% without the nine stations, but for the 10-day test, the false positive error rates improved but remained at 12%, reflecting that the 10-day results are a poor predictor of the porewater-based concentration-response relationships when compared to the 28-day test.

Based on these lines of evidence, the following are **concluded for the porewater concentration-response relationships:**

- Porewater concentrations of sediment COPECs were used as primary line of evidence to interpret results of sediment bioassays.
- Sediment bioassay results are best explained by porewater chemistry at most stations.
- Sediment bioassay results explained by confounding factor analysis at nine stations located adjacent to large CSO and MS4 discharge locations.
- No sediment bioassay stations were eliminated from consideration when interpreting the concentration-response relationships, but the interpretation of sediment bioassay results must consider confounding factors to understand the causes of toxicity.

References

Ankley et al. (Ankley G.T., D.M. Di Toro, D.J. Hansen, and W. Berry), 1996. Technical basis and proposal for deriving sediment quality criteria for metals. *Environmental Toxicology and Chemistry* 15(12):2056–2066.

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USEPA, 2003. *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures*. Office of Research and Development. USEPA 600-R-02-013. November 2003.

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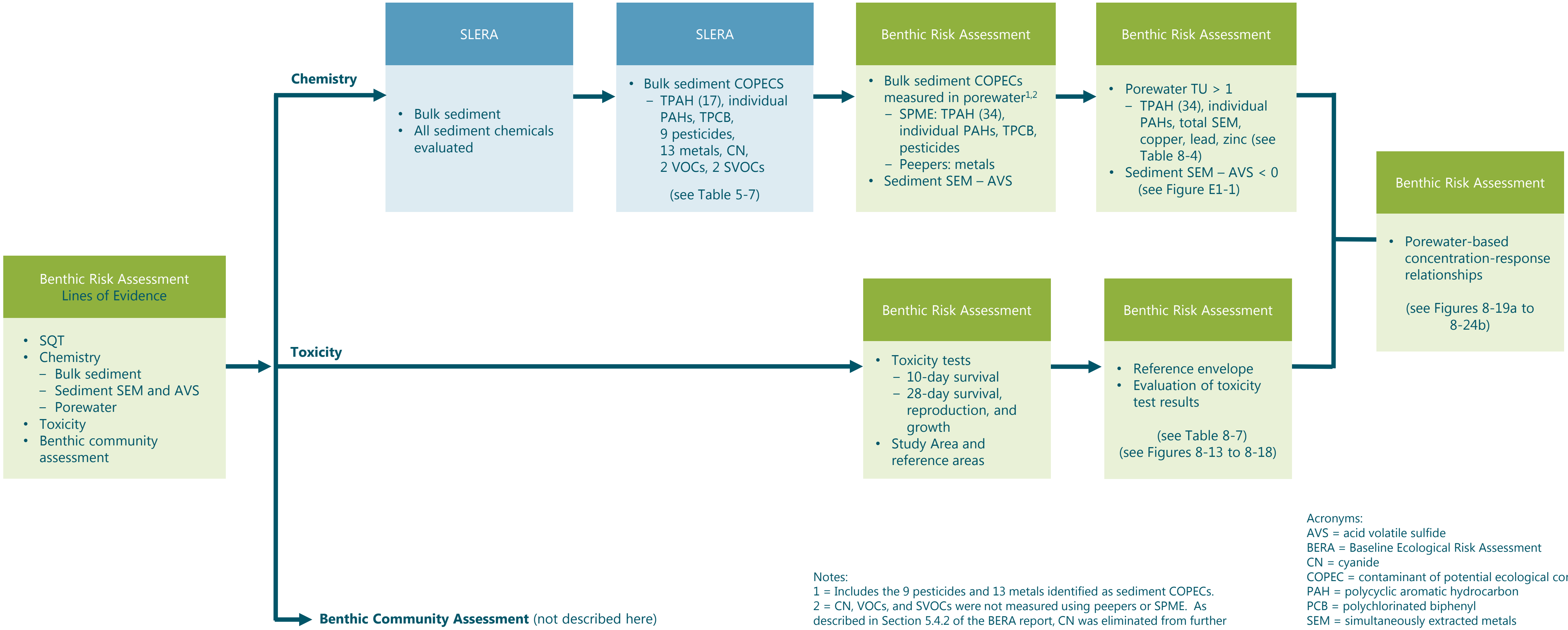
Benthic Macroinvertebrate Risk Assessment Process Flow Chart – Part 1

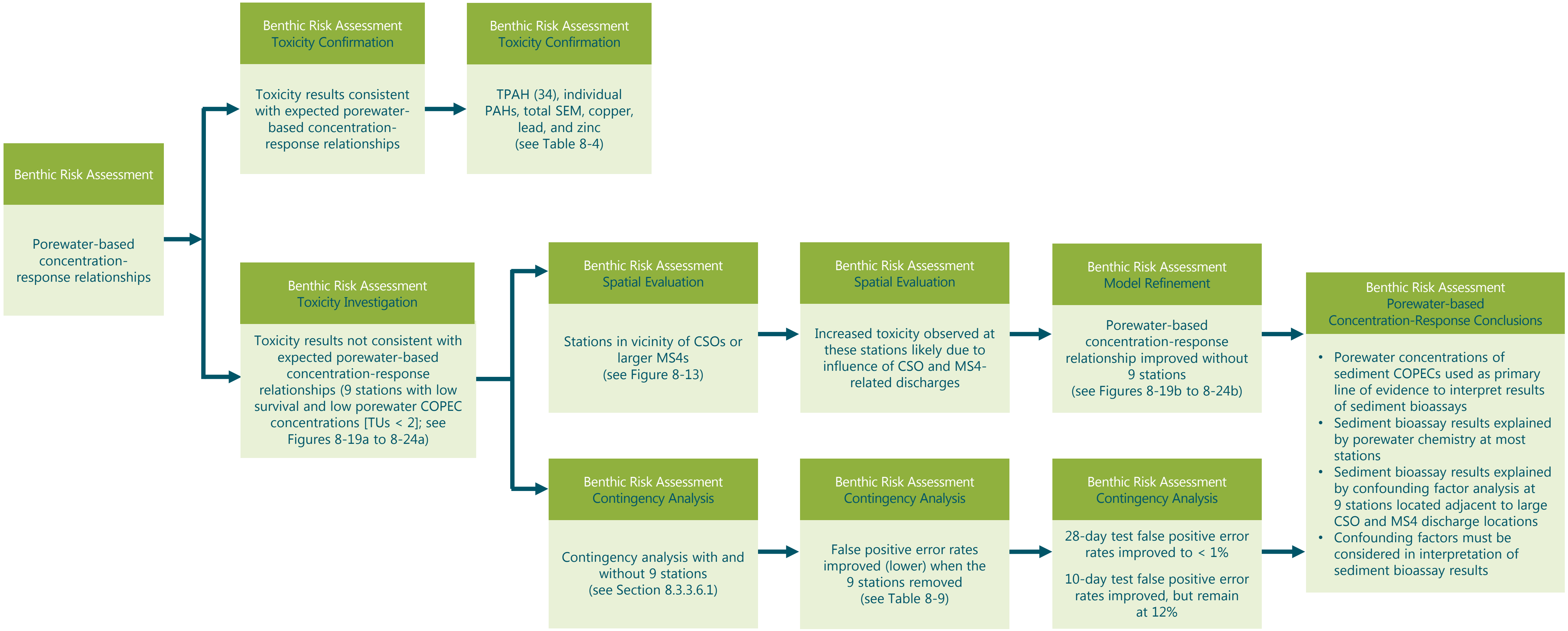


Notes:
1 = Includes the 9 pesticides and 13 metals identified as sediment COPECs.
2 = CN, VOCs, and SVOCs were not measured using peepers or SPME. As described in Section 5.4.2 of the BERA report, CN was eliminated from further evaluation because of uncertainty with the screening level, and the VOCs were eliminated from further evaluation because they were not measured in Phase 2 due to non-detected or low concentrations in Phase 1. The two SVOCs are addressed in the baseline in Section 8 of the BERA report.

Blue boxes capture the screening level risk analyses performed in Section 5 of the BERA report; the green boxes capture the baseline risk analyses performed for the benthic macroinvertebrates in Section 8 of the BERA report.

Acronyms:
AVS = acid volatile sulfide
BERA = Baseline Ecological Risk Assessment
CN = cyanide
COPEC = contaminant of potential ecological concern
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
SEM = simultaneously extracted metals
SLERA = Screening Level Ecological Risk Assessment
SQT = Sediment Quality Triad
SPME = solid-phase microextraction
SVOC = semivolatile organic compound
TPAH = total polycyclic aromatic hydrocarbons
TPCB = total polychlorinated biphenyls
TU = toxic unit
VOC = volatile organic compound

Benthic Macroinvertebrate Risk Assessment Process Flow Chart – Part 2



Acronyms:
COPEC = contaminant of potential ecological concern
CSO = combined sewer overflow
MS4 = municipal separate storm sewer system
PAH = polycyclic aromatic hydrocarbon
SEM = simultaneously extracted metals
TPAH = total polycyclic aromatic hydrocarbons
TU = toxic unit

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	***Conventional Parameters***													
	Cyanide	57-12-5	mg/kg	30	9.0	9.7	9.0	D	1.4	95% KM (% Bootstrap) UCL	0.1	--	Yes	95% UCL > SL
	Metals													
	Aluminum	7429-90-5	mg/kg	100	24,000	N/A	24,000	D	12,000	95% Chebyshev (Mean, Sd) UCL	18,000	--	No	95% UCL < SL
	Antimony	7440-36-0	mg/kg	100	110	N/A	110	D	7.1	95% Chebyshev (Mean, Sd) UCL	2	--	Yes	95% UCL > SL
	Arsenic	7440-38-2	mg/kg	100	400	N/A	400	D	36	95% Chebyshev (Mean, Sd) UCL	7.24	--	Yes	95% UCL > SL
	Barium	7440-39-3	mg/kg	100	680	N/A	680	D	170	95% Chebyshev (Mean, Sd) UCL	20	--	Yes	95% UCL > SL
	Beryllium	7440-41-7	mg/kg	99	1.9	0.67	1.9	D	0.69	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Cadmium	7440-43-9	mg/kg	100	250	N/A	250	D	25	95% Chebyshev (Mean, Sd) UCL	0.68	--	Yes	95% UCL > SL
	Chromium	7440-47-3	mg/kg	100	1,400	N/A	1,400	D	210	95% Chebyshev (Mean, Sd) UCL	52.3	--	Yes	95% UCL > SL
	Cobalt	7440-48-4	mg/kg	100	69	N/A	69	D	14	95% Chebyshev (Mean, Sd) UCL	50	--	No	95% UCL < SL
	Copper	7440-50-8	mg/kg	100	37,000	N/A	37,000	D	1,800	95% Chebyshev (Mean, Sd) UCL	18.7	--	Yes	95% UCL > SL
	Lead	7439-92-1	mg/kg	100	3,100	N/A	3,100	D	530	95% Chebyshev (Mean, Sd) UCL	30.2	--	Yes	95% UCL > SL
	Manganese	7439-96-5	mg/kg	100	830	N/A	830	D	310	95% Chebyshev (Mean, Sd) UCL	460	--	No	95% UCL < SL
	Mercury	7439-97-6	mg/kg	100	13	N/A	13	D	2.1	95% Chebyshev (Mean, Sd) UCL	0.13	--	Yes	95% UCL > SL
	Nickel	7440-02-0	mg/kg	100	4,200	N/A	4,200	D	250	95% Chebyshev (Mean, Sd) UCL	15.9	--	Yes	95% UCL > SL
	Selenium	7782-49-2	mg/kg	96	53	1.7	53	D	4.2	95% KM (BCA) UCL	2	--	Yes	95% UCL > SL
	Silver	7440-22-4	mg/kg	100	52	N/A	52	D	9.9	95% Chebyshev (Mean, Sd) UCL	0.73	--	Yes	95% UCL > SL
	Thallium	7440-28-0	mg/kg	99	2.5	0.44	2.5	D	0.37	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Tin	7440-31-5	mg/kg	100	250	N/A	250	D	47	95% Chebyshev (Mean, Sd) UCL	3.4	--	Yes	95% UCL > SL
	Vanadium	7440-62-2	mg/kg	100	150	N/A	150	D	51	95% Modified-t UCL	57	--	No	95% UCL < SL
	Zinc	7440-66-6	mg/kg	100	14,000	N/A	14,000	D	1,700	95% Chebyshev(Mean, Sd) UCL (H-UCL recommended)	124	--	Yes	95% UCL > SL
	Organometallic Compounds													
	Methyl mercury	22967-92-6	µg/kg	88	26	0.92	26	D	2.7	95% KM (Chebyshev) UCL	100	--	No	Max Conc < SL
	Volatile Organic Compounds													
	1,1,1-Trichloroethane	71-55-6	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.856	EqP	No	Max Conc < SL
	1,1,2,2-Tetrachloroethane	79-34-5	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.202	EqP	No	Max Conc < SL
	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	µg/kg	0	N/A	14,000	14,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	1,1,2-Trichloroethane	79-00-5	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.57	EqP	No	Max Conc < SL
	1,1-Dichloroethane	75-34-3	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.00057	EqP	Uncertain	FoD < 5%_RL > SL
	1,1-Dichloroethene	75-35-4	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	2.78	EqP	No	Max Conc < SL
	1,2,3-Trichlorobenzene	87-61-6	µg/kg	0.59	19	3,600	19	D	N/A	N/A	858	--	No	Max Conc < SL
	1,2,4-Trichlorobenzene	120-82-1	mg/kg (at 1% TOC)	2.4	0.033	0.18	0.033	D	N/A	N/A	0.473	EqP	No	Max Conc < SL
	1,2-Dibromo-3-chloropropane	96-12-8	µg/kg	0	N/A	3,600	3,600	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	1,2-Dichlorobenzene	95-50-1	mg/kg (at 1% TOC)	6	0.0084	0.18	0.0084	D	0.00078	95% KM (Percentile Bootstrap) UCL	0.989	EqP	No	Max Conc < SL
	1,2-Dichloroethane	107-06-2	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.26	EqP	No	Max Conc < SL

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	1,2-Dichloroethene, cis-	156-59-2	µg/kg	8.1	5.6	1,700	5.6	D	1.7	95% KM (Percentile Bootstrap) UCL	1,050	--	No	Max Conc < SL
	1,2-Dichloroethene, trans-	156-60-5	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	1,050	--	No	Max Conc < SL
	1,2-Dichloropropane	78-87-5	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.333	EqP	No	Max Conc < SL
	1,3-Dichlorobenzene	541-73-1	mg/kg (at 1% TOC)	0	N/A	0.18	0.18	ND	N/A	N/A	0.842	EqP	No	Max Conc < SL
	1,3-Dichloropropene, cis-	10061-01-5	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	1,3-Dichloropropene, trans-	10061-02-6	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	1,4-Dichlorobenzene	106-46-7	mg/kg (at 1% TOC)	25	0.076	0.18	0.076	D	0.0043	95% KM (BCA) UCL	0.46	EqP	No	Max Conc < SL
	2-Butanone (MEK)	78-93-3	mg/kg (at 1% TOC)	62	0.033	0.36	0.033	D	0.012	95% GROS Approximate Gamma UCL	0.0424	EqP	No	Max Conc < SL
	2-Hexanone (Methyl butyl ketone)	591-78-6	mg/kg (at 1% TOC)	0	N/A	0.36	0.36	ND	N/A	N/A	0.0582	EqP	Uncertain	FoD < 5%_RL > SL
	Acetone	67-64-1	mg/kg (at 1% TOC)	62	0.15	1.3	0.15	D	0.051	95% KM (Percentile Bootstrap) UCL	0.1997	EqP	No	Max Conc < SL
	Benzene	71-43-2	mg/kg (at 1% TOC)	25	0.46	0.16	0.46	D	0.063	97.5% KM (Chebyshev) UCL	0.137	EqP	No	95% UCL < SL
	Bromochloromethane	74-97-5	µg/kg	0	N/A	3,600	3,600	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Bromodichloromethane	75-27-4	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Bromoform (Tribromomethane)	75-25-2	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	1.31	EqP	No	Max Conc < SL
	Bromomethane (Methyl bromide)	74-83-9	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.00137	EqP	Uncertain	FoD < 5%_RL > SL
	Carbon disulfide	75-15-0	mg/kg (at 1% TOC)	68	0.028	0.16	0.028	D	0.0090	95% GROS Approximate Gamma UCL	0.00085	EqP	Yes	95% UCL > SL
	Carbon tetrachloride (Tetrachloromethane)	56-23-5	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	7.24	EqP	No	Max Conc < SL
	Chlorobenzene	108-90-7	mg/kg (at 1% TOC)	14	0.0070	0.16	0.0070	D	0.0012	95% KM (Chebyshev) UCL	0.162	EqP	No	Max Conc < SL
	Chloroethane	75-00-3	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Chloroform	67-66-3	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	0.0954	EqP	No	Max Conc < SL
	Chloromethane	74-87-3	µg/kg	0	N/A	3,600	3,600	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Cyclohexane	110-82-7	µg/kg	5	800	14,000	800	D	22	95% KM (Percentile Bootstrap) UCL	NA	--	Uncertain	FoD < 5%_No SL
	Dibromochloromethane	124-48-1	µg/kg	0	N/A	1,700	1,700	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Dichlorodifluoromethane	75-71-8	µg/kg	0	N/A	7,200	7,200	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Dichloromethane (Methylene chloride)	75-09-2	mg/kg (at 1% TOC)	6	0.0019	0.36	0.0019	D	0.0017	95% KM (Percentile Bootstrap) UCL	0.159	EqP	No	Max Conc < SL
	Ethylbenzene	100-41-4	mg/kg (at 1% TOC)	30	1.1	0.13	1.1	D	0.11	95% Approximate Gamma KM-UCL	0.305	EqP	No	95% UCL < SL
	Ethylene dibromide (1,2-Dibromoethane)	106-93-4	µg/kg	0	N/A	2,900	2,900	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Isopropylbenzene (Cumene)	98-82-8	µg/kg	23	820	1,700	820	D	97	97.5% KM (Chebyshev) UCL	86	--	Yes	95% UCL > SL
	Methyl acetate	79-20-9	µg/kg	0.58	20,000	12,000	20,000	D	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Methyl isobutyl ketone (4-Methyl-2-pentanone or (MIBK))	108-10-1	mg/kg (at 1% TOC)	3.6	0.0015	0.4	0.0015	D	N/A	N/A	0.0251	EqP	No	Max Conc < SL
	Methyl tert-butyl ether (MTBE)	1634-04-4	µg/kg	4.1	65	1,700	65	D	4.0	95% KM (Percentile Bootstrap) UCL	NA	--	Uncertain	FoD < 5%_No SL
	Methylcyclohexane	108-87-2	µg/kg	11	3,500	2,900	3,500	D	130	95% Approximate Gamma KM-UCL	NA	--	Uncertain	FoD > 5%_No SL
	Styrene	100-42-5	mg/kg (at 1% TOC)	0	N/A	0.16	0.16	ND	N/A	N/A	7.07	EqP	No	Max Conc < SL
	Tetrachloroethene (PCE)	127-18-4	mg/kg (at 1% TOC)	1.2	0.00017	0.16	0.00017	D	N/A	N/A	0.19	EqP	No	Max Conc < SL
	Toluene	108-88-3	mg/kg (at 1% TOC)	31	0.89	0.16	0.89	D	0.12	97.5% KM (Chebyshev) UCL	1.09	EqP	No	Max Conc < SL
	Total Xylene (KM) (RL)	tXylene_KM_RL	mg/kg (at 1% TOC)	12	0.096	0.073	0.096	D	0.019	99% KM (Chebyshev) UCL	0.046	EqP	No	95% UCL < SL
	Total xylene (reported, not calculated)	1330-20-7	µg/kg	64	11,000	5,200	11,000	D	6,800	95% GROS Adjusted Gamma UCL	NA	--	Uncertain	FoD > 5%_No SL

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	Trichloroethene (TCE)	79-01-6	mg/kg (at 1% TOC)	2.4	0.00046	0.16	0.00046	D	N/A	N/A	8.95	EqP	No	Max Conc < SL
	Trichlorofluoromethane (Fluorotrichloromethane)	75-69-4	µg/kg	0	N/A	3,600	3,600	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Vinyl acetate	108-05-4	mg/kg (at 1% TOC)	0	N/A	0.36	0.36	ND	N/A	N/A	0.013	EqP	Uncertain	FoD < 5%_RL > SL
	Vinyl chloride	75-01-4	mg/kg (at 1% TOC)	3.6	0.00029	0.16	0.00029	D	N/A	N/A	0.43067	EqP	No	Max Conc < SL
	Semivolatile Organics													
	1,2,4,5-Tetrachlorobenzene	95-94-3	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	47	EqP	No	Max Conc < SL
	1,4-Dioxane	123-91-1	mg/kg (at 1% TOC)	0	N/A	14	14	ND	N/A	N/A	0.587	EqP	Uncertain	FoD < 5%_RL > SL
	2,3,4,6-Tetrachlorophenol	58-90-2	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	284	--	Uncertain	FoD < 5%_RL > SL
	2,4,5-Trichlorophenol	95-95-4	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	0.819	EqP	Uncertain	FoD < 5%_RL > SL
	2,4,6-Trichlorophenol	88-06-2	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	2.65	EqP	Uncertain	FoD < 5%_RL > SL
	2,4-Dichlorophenol	120-83-2	µg/kg	0	N/A	17,000	17,000	ND	N/A	N/A	117	--	Uncertain	FoD < 5%_RL > SL
	2,4-Dimethylphenol	105-67-9	µg/kg	0.86	1,200	85,000	1,200	D	N/A	N/A	29	--	Uncertain	FoD < 5%_RL > SL
	2,4-Dinitrophenol	51-28-5	mg/kg (at 1% TOC)	0	N/A	37	37	ND	N/A	N/A	0.00621	EqP	Uncertain	FoD < 5%_RL > SL
	2,4-Dinitrotoluene	121-14-2	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	41.6	--	Uncertain	FoD < 5%_RL > SL
	2,6-Dinitrotoluene	606-20-2	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	0.15503	EqP	Uncertain	FoD < 5%_RL > SL
	2-Chloronaphthalene	91-58-7	mg/kg (at 1% TOC)	0	N/A	1.4	1.4	ND	N/A	N/A	0.417	EqP	Uncertain	FoD < 5%_RL > SL
	2-Chlorophenol	95-57-8	mg/kg (at 1% TOC)	0.36	0.0058	7.2	0.0058	D	N/A	N/A	0.344	EqP	No	Max Conc < SL
	2-Methylphenol (o-Cresol)	95-48-7	µg/kg	0.55	54	85,000	54	D	N/A	N/A	8	--	Uncertain	FoD < 5%_RL > SL
	2-Nitroaniline	88-74-4	µg/kg	0	N/A	440,000	440,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	2-Nitrophenol	88-75-5	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	3,3'-Dichlorobenzidine	91-94-1	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	2.06	EqP	Uncertain	FoD < 5%_RL > SL
	3-Methylphenol & 4-Methylphenol (m&p-Cresol)	MEPH3_4	µg/kg	64	40,000	7,200	40,000	D	1,400	95% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	3-Nitroaniline	99-09-2	µg/kg	0	N/A	440,000	440,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	4-Bromophenyl-phenyl ether	101-55-3	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	1,230	--	Uncertain	FoD < 5%_RL > SL
	4-Chloro-3-methylphenol	59-50-7	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	0.388	EqP	Uncertain	FoD < 5%_RL > SL
	4-Chloroaniline	106-47-8	mg/kg (at 1% TOC)	18	0.080	7.2	0.080	D	0.026	95% KM (t) UCL	0.146	EqP	No	Max Conc < SL
	4-Chlorophenyl phenyl ether	7005-72-3	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	4-Nitroaniline	100-01-6	µg/kg	0	N/A	440,000	440,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	4-Nitrophenol	100-02-7	mg/kg (at 1% TOC)	0	N/A	37	37	ND	N/A	N/A	0.0133	EqP	Uncertain	FoD < 5%_RL > SL
	Acetophenone	98-86-2	µg/kg	40	2,700	85,000	2,700	D	290	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Atrazine	1912-24-9	µg/kg	0.27	110	85,000	110	D	N/A	N/A	6.62	--	Uncertain	FoD < 5%_RL > SL
	Benzaldehyde	100-52-7	µg/kg	72	3,000	85,000	3,000	D	510	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Biphenyl (1,1'-Biphenyl)	92-52-4	µg/kg	63	2,800	85,000	2,800	D	210	95% KM (BCA) UCL	1,220	--	No	95% UCL < SL
	Butylbenzyl phthalate	85-68-7	mg/kg (at 1% TOC)	73	0.49	7.2	0.49	D	0.081	95% KM (Percentile Bootstrap) UCL	16.8	EqP	No	Max Conc < SL
	Caprolactam	105-60-2	µg/kg	4.4	22,000	440,000	22,000	D	640	95% KM (BCA) UCL	NA	--	Uncertain	FoD < 5%_No SL
	Di-n-butyl phthalate	84-74-2	mg/kg (at 1% TOC)	68	0.81	7.2	0.81	D	0.050	95% KM (BCA) UCL	1.16	EqP	No	Max Conc < SL
	Di-n-octyl phthalate	117-84-0	µg/kg	52	8,100	85,000	8,100	D	880	95% Approximate Gamma KM-UCL	61	--	Yes	95% UCL > SL

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	Dibenzofuran	132-64-9	mg/kg (at 1% TOC)	60	0.49	7.2	0.49	D	0.047	95% KM (% Bootstrap) UCL	7.3	EqP	No	Max Conc < SL
	Diethyl phthalate	84-66-2	mg/kg (at 1% TOC)	2.2	0.032	7.2	0.032	D	0.0079	95% KM (Percentile Bootstrap) UCL	0.218	EqP	No	Max Conc < SL
	Dimethyl phthalate	131-11-3	µg/kg	5	460	85,000	460	D	120	95% KM (Percentile Bootstrap) UCL	6	--	Uncertain	FoD < 5%_RL > SL
	Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	534-52-1	mg/kg (at 1% TOC)	0	N/A	37	37	ND	N/A	N/A	0.104	EqP	Uncertain	FoD < 5%_RL > SL
	Hexachlorobutadiene (Hexachloro-1,3-butadiene)	87-68-3	mg/kg (at 1% TOC)	0	N/A	1.4	1.4	ND	N/A	N/A	0.17	EqP	Uncertain	FoD < 5%_RL > SL
	Hexachlorocyclopentadiene	77-47-4	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	0.139	EqP	Uncertain	FoD < 5%_RL > SL
	Hexachloroethane	67-72-1	mg/kg (at 1% TOC)	0	N/A	7.2	7.2	ND	N/A	N/A	0.804	EqP	Uncertain	FoD < 5%_RL > SL
	Isophorone	78-59-1	mg/kg (at 1% TOC)	0.72	0.86	7.2	0.86	D	N/A	N/A	0.432	EqP	Uncertain	FoD < 5%_RL > SL
	Nitrobenzene	98-95-3	µg/kg	0	N/A	170,000	170,000	ND	N/A	N/A	21	--	Uncertain	FoD < 5%_RL > SL
	Pentachlorophenol	87-86-5	mg/kg (at 1% TOC)	0.76	0.22	7.2	0.22	D	N/A	N/A	7.97	EqP	No	Max Conc < SL
	Phenol	108-95-2	µg/kg	31	3,100	17,000	3,100	D	150	95% KM (BCA) UCL	420	--	No	95% UCL < SL
	bis(2-Chloroethoxy)methane	111-91-1	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	bis(2-Chloroethyl)ether	111-44-4	mg/kg (at 1% TOC)	0	N/A	1.4	1.4	ND	N/A	N/A	3.52	EqP	No	Max Conc < SL
	bis(2-Ethylhexyl)phthalate	117-81-7	µg/kg	100	510,000	N/A	510,000	D	55,000	95% Chebyshev (Mean, Sd) UCL	182	--	Yes	95% UCL > SL
	n-Nitrosodiphenylamine	86-30-6	mg/kg (at 1% TOC)	0.72	0.020	7.2	0.020	D	N/A	N/A	422	EqP	No	Max Conc < SL
	Polycyclic Aromatic Hydrocarbons (PAHs)													
	1-Methylnaphthalene	90-12-0	µg/kg	100	19,000	N/A	19,000	D	880	95% Chebyshev (Mean, Sd) UCL	NA	--	Uncertain	FoD > 5%_No SL
	1-Methylphenanthrene	832-69-9	µg/kg	100	35,000	N/A	35,000	D	1,900	95% Chebyshev (Mean, Sd) UCL	NA	--	Uncertain	FoD > 5%_No SL
	2,3,5-Trimethylnaphthalene (1,6,7-Trimethylnaphthalene)	2245-38-7	µg/kg	100	17,000	N/A	17,000	D	1,100	95% Chebyshev (Mean, Sd) UCL	NA	--	Uncertain	FoD > 5%_No SL
	2,6-Dimethylnaphthalene	581-42-0	µg/kg	100	46,000	N/A	46,000	D	1,900	95% Chebyshev (Mean, Sd) UCL	NA	--	Uncertain	FoD > 5%_No SL
	2-Methylnaphthalene	91-57-6	µg/kg	98	28,000	11,000	28,000	D	1,700	95% KM (Chebyshev) UCL	20.2	--	Yes	95% UCL > SL
	4-Methylphenol (p-Cresol)	106-44-5	µg/kg	0	N/A	85,000	85,000	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Acenaphthene	83-32-9	µg/kg	98	35,000	7,700	35,000	D	2,200	95% KM (Chebyshev) UCL	6.71	--	Yes	95% UCL > SL
	Acenaphthylene	208-96-8	µg/kg	100	16,000	N/A	16,000	D	1,400	95% Chebyshev (Mean, Sd) UCL	5.87	--	Yes	95% UCL > SL
	Anthracene	120-12-7	µg/kg	99	46,000	7,700	46,000	D	3,000	95% KM (BCA) UCL	46.9	--	Yes	95% UCL > SL
	Benzo(a)anthracene	56-55-3	µg/kg	98	62,000	28,000	62,000	D	5,200	95% KM (BCA) UCL	74.8	--	Yes	95% UCL > SL
	Benzo(a)pyrene	50-32-8	µg/kg	98	55,000	20,000	55,000	D	5,000	95% KM (BCA) UCL	88.8	--	Yes	95% UCL > SL
	Benzo(b)fluoranthene	205-99-2	mg/kg (at 1% TOC)	97	2.6	1.4	2.6	D	0.56	95% KM (BCA) UCL	9.79	EqP	No	Max Conc < SL
	Benzo(b,k)fluoranthene	BKBFLANTH	µg/kg	100	16,000	N/A	16,000	D	8,200	95% Adjusted Gamma UCL	27.2	--	Yes	95% UCL > SL
	Benzo(j,k)fluoranthene	BKJFLANTH	mg/kg (at 1% TOC)	100	2.0	N/A	2.0	D	0.44	95% Student's-t UCL	9.8	EqP	No	Max Conc < SL
	Benzo(g,h,i)perylene	191-24-2	µg/kg	98	26,000	17,000	26,000	D	3,300	95% KM (BCA) UCL	170	--	Yes	95% UCL > SL
	Chrysene	218-01-9	µg/kg	98	57,000	31,000	57,000	D	5,600	95% KM (BCA) UCL	108	--	Yes	95% UCL > SL
	Dibenzo(a,h)anthracene	53-70-3	µg/kg	87	22,000	17,000	22,000	D	1,100	95% KM (BCA) UCL	6.22	--	Yes	95% UCL > SL
	Dibenzo(a,h)anthracene and Dibenzo(a,c)anthracene	215-58-753-70-3	µg/kg	100	7,900	N/A	7,900	D	1,000	95% Chebyshev (Mean, Sd) UCL	6.22	--	Yes	95% UCL > SL
	Fluoranthene	206-44-0	µg/kg	100	120,000	N/A	120,000	D	12,000	95% Chebyshev (Mean, Sd) UCL	113	--	Yes	95% UCL > SL
	Fluorene	86-73-7	µg/kg	95	14,000	13,000	14,000	D	840	95% KM (BCA) UCL	21.2	--	Yes	95% UCL > SL

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	Indeno(1,2,3-c,d)pyrene	193-39-5	µg/kg	98	26,000	17,000	26,000	D	3,400	95% KM (Chebyshev) UCL	17	--	Yes	95% UCL > SL
	Naphthalene	91-20-3	µg/kg	97	110,000	11,000	110,000	D	4,400	95% KM (Chebyshev) UCL	34.6	--	Yes	95% UCL > SL
	Perylene	198-55-0	mg/kg (at 1% TOC)	100	1.2	N/A	1.2	D	0.20	95% Chebyshev (Mean, Sd) UCL	9.67	EqP	No	Max Conc < SL
	Phenanthrene	85-01-8	µg/kg	95	68,000	13,000	68,000	D	4,700	95% KM (BCA) UCL	86.7	--	Yes	95% UCL > SL
	Pyrene	129-00-0	µg/kg	100	140,000	N/A	140,000	D	14,000	95% Chebyshev(Mean, Sd) UCL (H-UCL recommended)	153	--	Yes	95% UCL > SL
	Total HPAH (10 of 17) (KM) (RL)	tPAH_17_HM_KM_RL	µg/kg	100	530,000	150,000	530,000	D	55,000	95% KM (BCA) UCL	655	--	Yes	95% UCL > SL
	Total LPAH (7 of 17) (KM) (RL)	tPAH_17_LM_KM_RL	µg/kg	96	260,000	33,000	260,000	D	16,000	95% KM (BCA) UCL	312	--	Yes	95% UCL > SL
	Total PAH (17) (KM) (RL)	tPAH_17_KM_RL	µg/kg	98	780,000	95,000	780,000	D	71,000	95% KM (BCA) UCL	2,900	--	Yes	95% UCL > SL
	Pesticides													
	2,4'-DDD (o,p'-DDD)	53-19-0	µg/kg	82	430	120	430	D	40	95% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	2,4'-DDE (o,p'-DDE)	3424-82-6	µg/kg	86	140	140	140	D	8.4	95% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	2,4'-DDT (o,p'-DDT)	789-02-6	µg/kg	17	1,700	140	1,700	D	37	97.5% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	4,4'-DDD (p,p'-DDD)	72-54-8	µg/kg	92	1,000	140	1,000	D	84	95% KM (Chebyshev) UCL	1.22	--	Yes	95% UCL > SL
	4,4'-DDE (p,p'-DDE)	72-55-9	µg/kg	96	480	140	480	D	67	95% KM (Chebyshev) UCL	2.07	--	Yes	95% UCL > SL
	4,4'-DDT (p,p'-DDT)	50-29-3	µg/kg	66	390	150	390	D	26	95% KM (Chebyshev) UCL	1.19	--	Yes	95% UCL > SL
	Aldrin	309-00-2	µg/kg	34	150	140	150	D	4.0	95% KM (Chebyshev) UCL	2	--	Yes	95% UCL > SL
	Chlordane, alpha- (Chlordane, cis-)	5103-71-9	mg/kg (at 1% TOC)	86	0.034	0.017	0.034	D	0.0069	95% KM (Chebyshev) UCL	0.0042	EqP	Yes	95% UCL > SL
	Chlordane, beta- (Chlordane, trans-)	5103-74-2	mg/kg (at 1% TOC)	84	0.049	0.011	0.049	D	0.0092	95% GROS Approximate Gamma UCL	0.0042	EqP	Yes	95% UCL > SL
	Dieldrin	60-57-1	µg/kg	82	280	140	280	D	26	95% KM (Chebyshev) UCL	0.72	--	Yes	95% UCL > SL
	Endosulfan sulfate	1031-07-8	mg/kg (at 1% TOC)	12	0.00050	0.017	0.00050	D	0.00050	Maximum (recommended UCL > Max)	0.00036	EqP	Yes	95% UCL > SL
	Endosulfan, alpha- (I)	959-98-8	µg/kg	7.2	25	140	25	D	1.1	95% KM (Percentile Bootstrap) UCL	2.9	--	No	95% UCL < SL
	Endosulfan, beta (II)	33213-65-9	µg/kg	16	11	140	11	D	0.66	95% KM (BCA) UCL	14	--	No	Max Conc < SL
	Endrin	72-20-8	µg/kg	25	350	140	350	D	10	95% KM (Chebyshev) UCL	2.67	--	Yes	95% UCL > SL
	Endrin aldehyde	7421-93-4	mg/kg (at 1% TOC)	9.4	0.00093	0.017	0.00093	D	0.0009	Maximum (recommended UCL > Max)	0.48	EqP	No	Max Conc < SL
	Endrin ketone	53494-70-5	µg/kg	18	140	130	140	D	2.2	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Heptachlor	76-44-8	µg/kg	22	120	140	120	D	2.6	95% KM (Chebyshev) UCL	68	--	No	95% UCL < SL
	Heptachlor epoxide	1024-57-3	µg/kg	72	130	140	130	D	5.6	95% KM (Chebyshev) UCL	0.6	--	Yes	95% UCL > SL
	Hexachlorobenzene	118-74-1	µg/kg	63	150	17,000	150	D	10	95% KM (Chebyshev) UCL	20	--	No	95% UCL < SL
	Hexachlorocyclohexane (BHC), alpha-	319-84-6	mg/kg (at 1% TOC)	40	0.0063	0.017	0.0063	D	0.0001	95% KM (% Bootstrap) UCL	1.36	EqP	No	Max Conc < SL
	Hexachlorocyclohexane (BHC), beta-	319-85-7	µg/kg	35	57	140	57	D	0.69	95% KM (% Bootstrap) UCL	5	--	No	95% UCL < SL
	Hexachlorocyclohexane (BHC), delta-	319-86-8	µg/kg	24	160	140	160	D	5.1	95% KM (Chebyshev) UCL	6,400	--	No	Max Conc < SL
	Hexachlorocyclohexane (BHC), gamma- (Lindane)	58-89-9	µg/kg	13	3.0	140	3.0	D	0.16	95% KM (t) UCL	0.32	--	No	95% UCL < SL

Table 5-7
Surface Sediment Screen

Exposure Point	Chemical	CAS RN	Units	Frequency of Detection (%)	Maximum Detected Concentration[1]	Maximum Non-detect Concentration[1]	Maximum Concentration[1]	Basis for Maximum (D/ND)	95% UCL[1]	UCL Type	Screening Level	Screening Level Note	COPEC Flag	Rationale for COPEC Flag
Study Area	Methoxychlor	72-43-5	mg/kg (at 1% TOC)	41	0.013	0.033	0.013	D	0.0075	95% GROS Approximate Gamma UCL	0.0296	EqP	No	Max Conc < SL
	Mirex	2385-85-5	µg/kg	56	21	140	21	D	0.95	95% KM (% Bootstrap) UCL	7	--	No	95% UCL < SL
	Nonachlor, cis-	5103-73-1	µg/kg	82	110	140	110	D	14	95% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Nonachlor, trans-	39765-80-5	µg/kg	91	260	5,500	260	D	44	97.5% KM (Chebyshev) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Oxychlordane	27304-13-8	µg/kg	31	44	140	44	D	0.72	95% KM (BCA) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Toxaphene	8001-35-2	mg/kg (at 1% TOC)	0	N/A	0.67	0.67	ND	N/A	N/A	0.536	EqP	No	Max Conc < SL
	Herbicides													
	2,2-Dichloropropionic acid (Dalapon)	75-99-0	µg/kg	0	N/A	620	620	ND	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)	93-76-5	µg/kg	4.3	23	140	23	D	19	95% KM (Percentile Bootstrap) UCL	12,300	--	No	Max Conc < SL
	2,4,5-TP (Silvex)	93-72-1	µg/kg	2.5	26	140	26	D	20	95% KM (t) UCL	675	--	No	Max Conc < SL
	2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	mg/kg (at 1% TOC)	6.8	0.011	0.076	0.011	D	0.0091	95% KM (Percentile Bootstrap) UCL	1.273	EqP	No	Max Conc < SL
	2,4-DB (2,4-D derivative)	94-82-6	µg/kg	1.2	120	550	120	D	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Dicamba	1918-00-9	mg/kg (at 1% TOC)	2.7	0.0057	0.045	0.0057	D	N/A	N/A	0.313	EqP	No	Max Conc < SL
	Dichlorprop	120-36-5	µg/kg	24	440	550	440	D	100	95% KM (t) UCL	NA	--	Uncertain	FoD > 5%_No SL
	Dinoseb	88-85-7	µg/kg	0.63	37	83	37	D	N/A	N/A	0.611	--	Uncertain	FoD < 5%_RL > SL
	Mecoprop (MCPP)	93-65-2	µg/kg	0.62	28,000	55,000	28,000	D	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Mephanac (MCPA)	94-74-6	µg/kg	1.2	9,300	55,000	9,300	D	N/A	N/A	NA	--	Uncertain	FoD < 5%_No SL
	Polychlorinated Biphenyl (PCB) Congeners													
	Total PCB Congener (KM) (RL)	tPCBCong_KM_RL	ng/kg	100	3.8E+08	N/A	3.8E+08	D	1E+07	95% Chebyshev (Mean, Sd) UCL	40,000	--	Yes	95% UCL > SL

Notes:
1 = Values are rounded to two significant figures. Statistics (e.g., 95% UCLs) and hazard quotients were calculated prior to rounding.
95% UCL < SL = 95% UCL less than the screening level
95% UCL > SL = 95% UCL greater than the screening level
FoD < 5%_No SL = frequency of detection less than 5% and no screening level
FoD < 5%_RL > SL = frequency of detection less than 5% and reporting limit greater than screening level
FoD > 5%_No SL = frequency of detection greater than 5% and no screening level
Max Conc < SL = maximum concentration less than the screening level

Acronyms:
-- = none
µg/kg = microgram per kilogram
95% UCL = 95% upper confidence limit
BCA = bias-corrected accelerated
CAS RN = Chemical Abstracts Service Registry Number
COPEC = contaminant of potential ecological concern
D = detect
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
EqP = equilibrium partitioning
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
H-UCL = high upper confidence limit
KM = Kaplan-Meier
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram per kilogram
mg/kg (at 1% TOC) = milligram per kilogram, normalized to 1% total organic carbon
N/A = not applicable
NA = not available
ND = non-detect
ng/kg = nanogram per kilogram
RL = reporting limit
Sd = standard deviation
(t) = Student's-t
TOC = total organic carbon
UCL = upper confidence limit

Table 8-4a
Study Area Porewater Toxic Unit Calculations

Exposure Area	Matrix	Group	Chemical	CAS RN	Fraction	Unit	Count	Frequency of Detection	Minimum Concentration[1]	Maximum Concentration[1]	Detect Flag	Chronic Threshold Value	Minimum Toxic Unit[1]	Maximum Toxic Unit[1]
Study Area	PEEP	METDISS	Antimony	7440-36-0	D	µg/L	36	50	0.080	0.42	D	500	0.00016	0.00084
	PEEP	METDISS	Arsenic	7440-38-2	D	µg/L	36	53	0.29	4.9	D	36	0.0081	0.14
	PEEP	METDISS	Barium	7440-39-3	D	µg/L	36	100	15	280	D	404	0.037	0.69
	PEEP	METDISS	Beryllium	7440-41-7	D	µg/L	36	0	0.080	0.080	ND	0.66	0.12	0.12
	PEEP	METDISS	Cadmium	7440-43-9	D	µg/L	36	36	0.020	0.97	D	8.8	0.0023	0.11
	PEEP	METDISS	Chromium	7440-47-3	D	µg/L	36	81	1.6	11	D	57.5	0.028	0.19
	PEEP	METDISS	Cobalt	7440-48-4	D	µg/L	36	58	0.12	0.80	D	23	0.0052	0.035
	PEEP	METDISS	Copper	7440-50-8	D	µg/L	36	69	0.42	16	D	5.6	0.075	2.9
	PEEP	METDISS	Lead	7439-92-1	D	µg/L	36	97	0.12	9.4	D	8.1	0.015	1.2
	PEEP	METDISS	Mercury	7439-97-6	D	µg/L	36	0	0.10	0.10	ND	0.94	0.11	0.11
	PEEP	METDISS	Nickel	7440-02-0	D	µg/L	36	58	0.60	3.8	D	8.2	0.073	0.46
	PEEP	METDISS	Selenium	7782-49-2	D	µg/L	36	19	0.41	25	D	71	0.0058	0.36
	PEEP	METDISS	Silver	7440-22-4	D	µg/L	36	3	0.10	0.10	D	0.23	0.43	0.43
	PEEP	METDISS	Thallium	7440-28-0	D	µg/L	36	0	0.12	0.12	ND	21.3	0.0056	0.0056
	PEEP	METDISS	Tin	7440-31-5	D	µg/L	36	58	0.18	0.79	D	73	0.0025	0.011
	PEEP	METDISS	Total SEM Metals TU	TSEM	D	µg/L	36	100	N/A	N/A	N/A	N/A	0.15	7.2
	PEEP	METDISS	Vanadium	7440-62-2	D	µg/L	36	100	0.40	6.0	D	20	0.020	0.30
	PEEP	METDISS	Zinc	7440-66-6	D	µg/L	36	100	1.0	430	D	81	0.012	5.3
	SPME	ALKPAH	C1-Benzanthracenes/Chrysenes	C1_218-01-9	D	µg/L	35	26	0.026	2.8	D	0.8557	0.030	3.3
	SPME	ALKPAH	C1-Fluoranthenes/Pyrenes	C1_FLRANPYRN	D	µg/L	35	43	0.095	13	D	4.887	0.019	2.7
	SPME	ALKPAH	C1-Fluorenes	C1_86-73-7	D	µg/L	35	63	0.15	9.6	D	13.99	0.011	0.69
	SPME	ALKPAH	C1-Phenanthrenes/Anthracenes	C1_PHENANTH	D	µg/L	35	57	0.10	25	D	7.436	0.013	3.4
	SPME	ALKPAH	C2-Benzanthracenes/Chrysenes	C2_218-01-9	D	µg/L	35	9	0.89	4.0	D	0.4827	1.8	8.3
	SPME	ALKPAH	C2-Fluorenes	C2_86-73-7	D	µg/L	35	46	0.31	23	D	5.305	0.057	4.2
	SPME	ALKPAH	C2-Naphthalenes	C2_91-20-3	D	µg/L	35	77	0.50	25	D	30.24	0.017	0.81
	SPME	ALKPAH	C2-Phenanthrenes/Anthracenes	C2_PHENANTH	D	µg/L	35	54	0.46	68	D	3.199	0.14	21
	SPME	ALKPAH	C3-Benzanthracenes/Chrysenes	C3_218-01-9	D	µg/L	35	3	4.4	4.4	D	0.1675	26	26
	SPME	ALKPAH	C3-Fluorenes	C3_86-73-7	D	µg/L	35	29	1.6	30	D	1.916	0.84	16
	SPME	ALKPAH	C3-Naphthalenes	C3_91-20-3	D	µg/L	35	77	0.20	140	D	11.1	0.018	13
	SPME	ALKPAH	C3-Phenanthrenes/Anthracenes	C3_PHENANTH	D	µg/L	35	43	0.26	47	D	1.256	0.21	37
	SPME	ALKPAH	C4-Benzanthracenes/Chrysenes	C4_218-01-9	D	µg/L	35	0	0.010	0.010	ND	0.07062	0.14	0.14
	SPME	ALKPAH	C4-Naphthalenes	C4_91-20-3	D	µg/L	35	66	0.40	150	D	4.048	0.099	36
	SPME	ALKPAH	C4-Phenanthrenes/Anthracenes	C4_PHENANTH	D	µg/L	35	31	0.57	73	D	0.5594	1.0	130
	SPME	PAH	1-Methylnaphthalene	90-12-0	D	µg/L	35	63	0.050	4.1	D	81.69	0.00061	0.05
	SPME	PAH	2-Methylnaphthalene	91-57-6	D	µg/L	35	51	0.060	2.0	D	81.69	0.00073	0.024
	SPME	PAH	Acenaphthene	83-32-9	D	µg/L	35	60	0.10	5.1	D	55.85	0.0018	0.091
	SPME	PAH	Acenaphthylene	208-96-8	D	µg/L	35	17	0.20	1.4	D	306.9	0.00065	0.0046
	SPME	PAH	Anthracene	120-12-7	D	µg/L	35	40	0.060	3.5	D	20.73	0.0029	0.17
	SPME	PAH	Benzo(a)anthracene	56-55-3	D	µg/L	35	57	0.0060	1.5	D	2.227	0.0027	0.65
	SPME	PAH	Benzo(a)pyrene	50-32-8	D	µg/L	35	14	0.030	0.50	D	0.9573	0.031	0.52
	SPME	PAH	Benzo(b,k)fluoranthene	BKBFLANTH	D	µg/L	35	14	0.18	0.84	D	0.6774	0.27	1.2
	SPME	PAH	Benzo(e)pyrene	192-97-2	D	µg/L	35	14	0.0090	0.45	D	0.9008	0.010	0.49

Table 8-4a
Study Area Porewater Toxic Unit Calculations

Exposure Area	Matrix	Group	Chemical	CAS RN	Fraction	Unit	Count	Frequency of Detection	Minimum Concentration[1]	Maximum Concentration[1]	Detect Flag	Chronic Threshold Value	Minimum Toxic Unit[1]	Maximum Toxic Unit[1]
Study Area	SPME	PAH	Benzo(g,h,i)perylene	191-24-2	D	µg/L	35	11	0.016	0.39	D	0.4391	0.036	0.89
	SPME	PAH	Chrysene	218-01-9	D	µg/L	35	57	0.010	1.3	D	2.042	0.0049	0.61
	SPME	PAH	Dibenzo(a,h)anthracene	53-70-3	D	µg/L	35	9	0.018	0.096	D	0.2825	0.064	0.34
	SPME	PAH	Fluoranthene	206-44-0	D	µg/L	35	94	0.010	5.9	D	7.109	0.0014	0.82
	SPME	PAH	Fluorene	86-73-7	D	µg/L	35	63	0.045	1.4	D	39.3	0.0011	0.036
	SPME	PAH	Indeno(1,2,3-c,d)pyrene	193-39-5	D	µg/L	35	11	0.0070	0.16	D	0.275	0.025	0.58
	SPME	PAH	Naphthalene	91-20-3	D	µg/L	35	71	0.10	21	D	193.5	0.00052	0.11
	SPME	PAH	Perylene	198-55-0	D	µg/L	35	11	0.024	0.65	D	0.9008	0.027	0.72
	SPME	PAH	Phenanthrene	85-01-8	D	µg/L	35	51	0.10	2.6	D	19.13	0.0052	0.13
	SPME	PAH	Pyrene	129-00-0	D	µg/L	35	94	0.020	6.1	D	10.11	0.0020	0.60
	SPME	PAH	Total PAH (34) TU	TPAH	D	µg/L	35	100	N/A	N/A	N/A	N/A	0.46	270
	SPME	PESTH	Aldrin	309-00-2	D	µg/L	33	9	0.00000034	0.0000057	D	0.13	0.0000026	0.000044
	SPME	PESTH	Chlordane, alpha- (Chlordane, cis-)	5103-71-9	D	µg/L	34	100	0.000046	0.0029	D	0.0064	0.0071	0.45
	SPME	PESTH	Chlordane, beta- (Chlordane, trans-)	5103-74-2	D	µg/L	34	100	0.000035	0.0031	D	0.0064	0.0054	0.48
	SPME	PESTH	Dieldrin	60-57-1	D	µg/L	34	100	0.00020	0.0085	D	0.11	0.0019	0.077
	SPME	PESTH	Endosulfan sulfate	1031-07-8	D	µg/L	34	0	0.000046	0.00056	ND	0.009	0.0051	0.063
	SPME	PESTH	Endosulfan, alpha- (I)	959-98-8	D	µg/L	34	21	0.00073	0.0084	D	0.0087	0.084	0.97
	SPME	PESTH	Endosulfan, beta (II)	33213-65-9	D	µg/L	34	0	0.00055	0.0068	ND	0.0087	0.063	0.78
	SPME	PESTH	Endrin	72-20-8	D	µg/L	34	0	0.0000090	0.000078	ND	0.01	0.00090	0.0078
	SPME	PESTH	Heptachlor	76-44-8	D	µg/L	34	0	0.0000020	0.000017	ND	0.0036	0.00056	0.0046
	SPME	PESTH	Heptachlor epoxide	1024-57-3	D	µg/L	34	88	0.000033	0.00056	D	0.0036	0.0093	0.16
	SPME	PESTH	Hexachlorobenzene	118-74-1	D	µg/L	34	100	0.0000050	0.00033	D	3.68	0.0000014	0.000091
	SPME	PESTH	Hexachlorocyclohexane (BHC), alpha-	319-84-6	D	µg/L	34	3	0.000043	0.000043	D	25	0.0000017	0.0000017
	SPME	PESTH	Hexachlorocyclohexane (BHC), delta-	319-86-8	D	µg/L	34	0	0.000015	0.000084	ND	141	0.00000010	0.00000060
	SPME	PESTH	Hexachlorocyclohexane (BHC), gamma- (Lindane)	58-89-9	D	µg/L	34	26	0.00014	0.00036	D	0.016	0.0086	0.023
	SPME	PESTH	Methoxychlor	72-43-5	D	µg/L	34	12	0.000074	0.0007	D	0.03	0.0025	0.023
	SPME	PESTH	Mirex	2385-85-5	D	µg/L	34	26	0.00000013	0.00000097	D	0.001	0.00013	0.00097
	SPME	PESTH	Oxychlordane	27304-13-8	D	µg/L	34	32	0.0000031	0.000021	D	0.0022	0.0014	0.0095
	SPME	PESTH	Total DDx High Resolution (KM) (MDL)	tDDT_KM_MDL	D	µg/L	34	100	0.00010	0.0017	D	0.007	0.014	0.24
	SPME	PCBCONG	Total PCB Congener (KM) (MDL)	tPCBCong_KM_MDL	D	ng/L	36	100	2.6	470	D	540	0.0049	0.87

Note:
1 = Values are rounded to two significant figures.

Acronyms:
µg/L = microgram per liter
ALKPAH = alkylated polycyclic aromatic hydrocarbon
CAS RN = Chemical Abstracts Service Registry Number
D = detect (Maximum Detect Flag column)
D = dissolved (Fraction column)
DDx = 2,4' and 4,4'-DDD, -DDE, -DDT
KM = Kaplan-Meier
MDL = method detection limit
METDISS = metals, dissolved
N/A = not applicable
ND = non-detect
ng/L = nanogram per liter
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PCBCONG = PCB congener
PEEP = peeper
PESTH = pesticides – high resolution
SEM = simultaneously extracted metals
SPME = solid-phase microextraction
TU = toxic unit

Table 8-4b
Reference Area Porewater Toxic Unit Calculations

Exposure Area	Matrix	Group	Chemical	CAS RN	Fraction	Unit	Count	Frequency of Detection	Minimum Concentration[1]	Maximum Concentration[1]	Detect Flag	Chronic Threshold Value	Minimum Toxic Unit[1]	Maximum Toxic Unit[1]
Reference Area	PEEP	METDISS	Antimony	7440-36-0	D	µg/L	24	21	0.084	0.28	D	500	0.00017	0.00056
	PEEP	METDISS	Arsenic	7440-38-2	D	µg/L	24	38	0.36	4.8	D	36	0.010	0.13
	PEEP	METDISS	Barium	7440-39-3	D	µg/L	24	100	12	230	D	404	0.030	0.57
	PEEP	METDISS	Beryllium	7440-41-7	D	µg/L	24	4	0.096	0.096	D	0.66	0.15	0.15
	PEEP	METDISS	Cadmium	7440-43-9	D	µg/L	24	4	0.036	0.036	D	8.8	0.0041	0.0041
	PEEP	METDISS	Chromium	7440-47-3	D	µg/L	24	88	1.3	7.3	D	57.5	0.022	0.13
	PEEP	METDISS	Cobalt	7440-48-4	D	µg/L	24	33	0.19	0.92	D	23	0.0083	0.04
	PEEP	METDISS	Copper	7440-50-8	D	µg/L	24	67	0.32	3.5	D	5.6	0.057	0.62
	PEEP	METDISS	Lead	7439-92-1	D	µg/L	24	83	0.10	6.8	D	8.1	0.012	0.84
	PEEP	METDISS	Mercury	7439-97-6	D	µg/L	24	0	0.10	0.10	ND	0.94	0.11	0.11
	PEEP	METDISS	Nickel	7440-02-0	D	µg/L	24	25	0.50	2.5	D	8.2	0.061	0.30
	PEEP	METDISS	Selenium	7782-49-2	D	µg/L	24	0	0.25	0.25	ND	71	0.0035	0.0035
	PEEP	METDISS	Silver	7440-22-4	D	µg/L	24	0	0.080	0.080	ND	0.23	0.35	0.35
	PEEP	METDISS	Thallium	7440-28-0	D	µg/L	24	0	0.12	0.12	ND	21.3	0.0056	0.0056
	PEEP	METDISS	Tin	7440-31-5	D	µg/L	24	54	0.18	0.60	D	73	0.0025	0.0082
	PEEP	METDISS	Total SEM Metals TU	TSEM	D	µg/L	24	100	N/A	N/A	ND	N/A	0.15	1.7
	PEEP	METDISS	Vanadium	7440-62-2	D	µg/L	24	100	0.92	5.8	D	20	0.046	0.29
	PEEP	METDISS	Zinc	7440-66-6	D	µg/L	24	100	1.0	10	D	81	0.012	0.12
	SPME	ALKPAH	C1-Benzanthracenes/Chrysenes	C1_218-01-9	D	µg/L	24	0	0.0050	0.0050	ND	0.8557	0.0058	0.0058
	SPME	ALKPAH	C1-Fluoranthenes/Pyrenes	C1_FLRANPYRN	D	µg/L	24	0	0.010	0.010	ND	4.887	0.0020	0.0020
	SPME	ALKPAH	C1-Fluorenes	C1_86-73-7	D	µg/L	24	8	0.15	0.2	D	13.99	0.011	0.014
	SPME	ALKPAH	C1-Phenanthrenes/Anthracenes	C1_PHENANTH	D	µg/L	24	4	0.10	0.10	D	7.436	0.013	0.013
	SPME	ALKPAH	C2-Benzanthracenes/Chrysenes	C2_218-01-9	D	µg/L	24	0	0.010	0.010	ND	0.4827	0.021	0.021
	SPME	ALKPAH	C2-Fluorenes	C2_86-73-7	D	µg/L	24	0	0.050	0.050	ND	5.305	0.0094	0.0094
	SPME	ALKPAH	C2-Naphthalenes	C2_91-20-3	D	µg/L	24	21	0.40	1.6	D	30.24	0.013	0.051
	SPME	ALKPAH	C2-Phenanthrenes/Anthracenes	C2_PHENANTH	D	µg/L	24	0	0.050	0.050	ND	3.199	0.016	0.016
	SPME	ALKPAH	C3-Benzanthracenes/Chrysenes	C3_218-01-9	D	µg/L	24	0	0.010	0.010	ND	0.1675	0.060	0.060
	SPME	ALKPAH	C3-Fluorenes	C3_86-73-7	D	µg/L	24	0	0.060	0.060	ND	1.916	0.031	0.031
	SPME	ALKPAH	C3-Naphthalenes	C3_91-20-3	D	µg/L	24	21	0.20	1.2	D	11.1	0.018	0.11
	SPME	ALKPAH	C3-Phenanthrenes/Anthracenes	C3_PHENANTH	D	µg/L	24	0	0.040	0.040	ND	1.256	0.032	0.032
	SPME	ALKPAH	C4-Benzanthracenes/Chrysenes	C4_218-01-9	D	µg/L	24	0	0.010	0.010	ND	0.07062	0.14	0.14
	SPME	ALKPAH	C4-Naphthalenes	C4_91-20-3	D	µg/L	24	13	0.31	0.63	D	4.048	0.075	0.15
	SPME	ALKPAH	C4-Phenanthrenes/Anthracenes	C4_PHENANTH	D	µg/L	24	0	0.020	0.020	ND	0.5594	0.036	0.036
	SPME	PAH	1-Methylnaphthalene	90-12-0	D	µg/L	24	38	0.050	0.20	D	81.69	0.00061	0.0024
	SPME	PAH	2-Methylnaphthalene	91-57-6	D	µg/L	24	46	0.050	0.20	D	81.69	0.00061	0.0024
	SPME	PAH	Acenaphthene	83-32-9	D	µg/L	24	13	0.10	0.20	D	55.85	0.0018	0.0036
	SPME	PAH	Acenaphthylene	208-96-8	D	µg/L	24	0	0.20	0.20	ND	306.9	0.00065	0.00065
	SPME	PAH	Anthracene	120-12-7	D	µg/L	24	0	0.050	0.050	ND	20.73	0.0024	0.0024
	SPME	PAH	Benzo(a)anthracene	56-55-3	D	µg/L	24	4	0.0040	0.0040	D	2.227	0.0018	0.0018
	SPME	PAH	Benzo(a)pyrene	50-32-8	D	µg/L	24	0	0.0080	0.0080	ND	0.9573	0.0084	0.0084
	SPME	PAH	Benzo(b,k)fluoranthene	BKBFLANTH	D	µg/L	24	0	0.0050	0.0050	ND	0.6774	0.0074	0.0074
	SPME	PAH	Benzo(e)pyrene	192-97-2	D	µg/L	24	0	0.0050	0.0050	ND	0.9008	0.0056	0.0056

Table 8-4b
Reference Area Porewater Toxic Unit Calculations

Exposure Area	Matrix	Group	Chemical	CAS RN	Fraction	Unit	Count	Frequency of Detection	Minimum Concentration[1]	Maximum Concentration[1]	Detect Flag	Chronic Threshold Value	Minimum Toxic Unit[1]	Maximum Toxic Unit[1]
Reference Area	SPME	PAH	Benzo(g,h,i)perylene	191-24-2	D	µg/L	24	0	0.0010	0.0010	ND	0.4391	0.0023	0.0023
	SPME	PAH	Chrysene	218-01-9	D	µg/L	24	4	0.0070	0.0070	D	2.042	0.0034	0.0034
	SPME	PAH	Dibenzo(a,h)anthracene	53-70-3	D	µg/L	24	0	0.0020	0.0020	ND	0.2825	0.0071	0.0071
	SPME	PAH	Fluoranthene	206-44-0	D	µg/L	24	63	0.010	0.080	D	7.109	0.0014	0.011
	SPME	PAH	Fluorene	86-73-7	D	µg/L	24	8	0.040	0.20	D	39.3	0.0010	0.0051
	SPME	PAH	Indeno(1,2,3-c,d)pyrene	193-39-5	D	µg/L	24	0	0.0010	0.0010	ND	0.275	0.0036	0.0036
	SPME	PAH	Naphthalene	91-20-3	D	µg/L	24	58	0.10	0.80	D	193.5	0.00052	0.0041
	SPME	PAH	Perylene	198-55-0	D	µg/L	24	0	0.0040	0.0040	ND	0.9008	0.0044	0.0044
	SPME	PAH	Phenanthrene	85-01-8	D	µg/L	24	4	0.30	0.30	D	19.13	0.016	0.016
	SPME	PAH	Pyrene	129-00-0	D	µg/L	24	54	0.010	0.30	D	10.11	0.00099	0.03
	SPME	PAH	Total PAH (34) TU	TPAH	D	µg/L	24	100	N/A	N/A	N/A	N/A	0.46	0.77
	SPME	PESTH	Aldrin	309-00-2	D	µg/L	23	0	0.000000092	0.0000019	ND	0.13	0.00000071	0.000015
	SPME	PESTH	Chlordane, alpha- (Chlordane, cis-)	5103-71-9	D	µg/L	23	100	0.000020	0.00051	D	0.0064	0.0032	0.08
	SPME	PESTH	Chlordane, beta- (Chlordane, trans-)	5103-74-2	D	µg/L	23	100	0.000020	0.00036	D	0.0064	0.0032	0.056
	SPME	PESTH	Dieldrin	60-57-1	D	µg/L	23	100	0.000099	0.0019	D	0.11	0.00090	0.017
	SPME	PESTH	Endosulfan sulfate	1031-07-8	D	µg/L	23	0	0.000036	0.00035	ND	0.009	0.0040	0.038
	SPME	PESTH	Endosulfan, alpha- (I)	959-98-8	D	µg/L	23	13	0.00057	0.0016	D	0.0087	0.065	0.19
	SPME	PESTH	Endosulfan, beta (II)	33213-65-9	D	µg/L	23	0	0.00034	0.004	ND	0.0087	0.039	0.47
	SPME	PESTH	Endrin	72-20-8	D	µg/L	23	0	0.0000076	0.000049	ND	0.01	0.00076	0.0049
	SPME	PESTH	Heptachlor	76-44-8	D	µg/L	23	0	0.00000082	0.000015	ND	0.0036	0.00023	0.0041
	SPME	PESTH	Heptachlor epoxide	1024-57-3	D	µg/L	23	91	0.000017	0.00077	D	0.0036	0.0048	0.21
	SPME	PESTH	Hexachlorobenzene	118-74-1	D	µg/L	23	70	0.0000029	0.000072	D	3.68	0.00000079	0.000019
	SPME	PESTH	Hexachlorocyclohexane (BHC), alpha-	319-84-6	D	µg/L	23	9	0.000024	0.000035	D	25	0.00000096	0.0000014
	SPME	PESTH	Hexachlorocyclohexane (BHC), delta-	319-86-8	D	µg/L	23	0	0.0000075	0.000068	ND	141	0.000000053	0.00000048
	SPME	PESTH	Hexachlorocyclohexane (BHC), gamma- (Lindane)	58-89-9	D	µg/L	23	0	0.000015	0.00014	ND	0.016	0.00094	0.0087
	SPME	PESTH	Methoxychlor	72-43-5	D	µg/L	23	0	0.0000048	0.000085	ND	0.03	0.00016	0.0028
	SPME	PESTH	Mirex	2385-85-5	D	µg/L	23	22	0.000000081	0.00000019	D	0.001	0.000081	0.00019
	SPME	PESTH	Oxychlordane	27304-13-8	D	µg/L	23	17	0.0000027	0.0000087	D	0.0022	0.0012	0.004
	SPME	PESTH	Total DDx High Resolution (KM) (MDL)	tDDT_KM_MDL	D	µg/L	23	100	0.000034	0.00038	D	0.007	0.0048	0.054
	SPME	PCBCONG	Total PCB Congener (KM) (MDL)	tPCBCong_KM_MDL	D	ng/L	24	100	0.37	2.3	D	540	0.00069	0.0042

Note:
1 = Values are rounded to two significant figures.

Acronyms:
µg/L = microgram per liter
ALKPAH = alkylated polycyclic aromatic hydrocarbon
CAS RN = Chemical Abstracts Service Registry Number
D = detect (Maximum Detect Flag column)
D = dissolved (Fraction column)
DDx = 2,4' and 4,4'-DDD, -DDE, -DDT
KM = Kaplan-Meier
MDL = method detection limit
METDISS = metals, dissolved
N/A = not applicable
ND = non-detect
ng/L = nanogram per liter
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PCBCONG = PCB congener
PEEP = peeper
PESTH = pesticides – high resolution
SEM = simultaneously extracted metals
SPME = solid-phase microextraction
TU = toxic unit

Table 8-4c
Porewater Chronic Threshold Values

Group	Chemical	CAS RN	Selected Chronic Threshold Value (µg/L)	Reference
ALKPAH	C1-Benzanthracenes/Chrysenes	C1_218-01-9	0.8557	USEPA 2003, EPA-600-R-02-013
ALKPAH	C1-Fluoranthenes/Pyrenes	C1_FLRANPYRN	4.887	USEPA 2003, EPA-600-R-02-013
ALKPAH	C1-Fluorenes	C1_86-73-7	13.99	USEPA 2003, EPA-600-R-02-013
ALKPAH	C1-Phenanthrenes/Anthracenes	C1_PHENANTH	7.436	USEPA 2003, EPA-600-R-02-013
ALKPAH	C2-Benzanthracenes/Chrysenes	C2_218-01-9	0.4827	USEPA 2003, EPA-600-R-02-013
ALKPAH	C2-Fluorenes	C2_86-73-7	5.305	USEPA 2003, EPA-600-R-02-013
ALKPAH	C2-Naphthalenes	C2_91-20-3	30.24	USEPA 2003, EPA-600-R-02-013
ALKPAH	C2-Phenanthrenes/Anthracenes	C2_PHENANTH	3.199	USEPA 2003, EPA-600-R-02-013
ALKPAH	C3-Benzanthracenes/Chrysenes	C3_218-01-9	0.1675	USEPA 2003, EPA-600-R-02-013
ALKPAH	C3-Fluorenes	C3_86-73-7	1.916	USEPA 2003, EPA-600-R-02-013
ALKPAH	C3-Naphthalenes	C3_91-20-3	11.1	USEPA 2003, EPA-600-R-02-013
ALKPAH	C3-Phenanthrenes/Anthracenes	C3_PHENANTH	1.256	USEPA 2003, EPA-600-R-02-013
ALKPAH	C4-Benzanthracenes/Chrysenes	C4_218-01-9	0.07062	USEPA 2003, EPA-600-R-02-013
ALKPAH	C4-Naphthalenes	C4_91-20-3	4.048	USEPA 2003, EPA-600-R-02-013
ALKPAH	C4-Phenanthrenes/Anthracenes	C4_PHENANTH	0.5594	USEPA 2003, EPA-600-R-02-013
METDISS	Antimony	7440-36-0	500	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
METDISS	Arsenic	7440-38-2	36	NYSDEC Saline Surface Waters (NYSDEC 1998)
METDISS	Barium	7440-39-3	404	USEPA, 1993. Water Quality Guidance for the Great Lakes System and Correction; Proposed Rules
METDISS	Beryllium	7440-41-7	0.66	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
METDISS	Cadmium	7440-43-9	8.8	National Recommended Water Quality Criteria (USEPA 2015)
METDISS	Chromium	7440-47-3	57.5	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
METDISS	Cobalt	7440-48-4	23	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
METDISS	Copper	7440-50-8	5.6	NYSDEC Saline Surface Waters (NYSDEC 1998)
METDISS	Lead	7439-92-1	8.1	National Recommended Water Quality Criteria (USEPA 2015)
METDISS	Mercury	7439-97-6	0.94	National Recommended Water Quality Criteria (USEPA 2015)
METDISS	Nickel	7440-02-0	8.2	National Recommended Water Quality Criteria (USEPA 2015)
METDISS	Selenium	7782-49-2	71	National Recommended Water Quality Criteria (USEPA 2015)
METDISS	Silver	7440-22-4	0.23	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
METDISS	Thallium	7440-28-0	21.3	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
METDISS	Tin	7440-31-5	73	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
METDISS	Vanadium	7440-62-2	20	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
METDISS	Zinc	7440-66-6	81	National Recommended Water Quality Criteria (USEPA 2015)
PAH	1-Methylnaphthalene	90-12-0	81.69	USEPA 2003, EPA-600-R-02-013
PAH	2-Methylnaphthalene	91-57-6	81.69	USEPA 2003, EPA-600-R-02-013
PAH	Acenaphthene	83-32-9	55.85	USEPA 2003, EPA-600-R-02-013
PAH	Acenaphthylene	208-96-8	306.9	USEPA 2003, EPA-600-R-02-013
PAH	Anthracene	120-12-7	20.73	USEPA 2003, EPA-600-R-02-013
PAH	Benzo(a)anthracene	56-55-3	2.227	USEPA 2003, EPA-600-R-02-013
PAH	Benzo(a)pyrene	50-32-8	0.9573	USEPA 2003, EPA-600-R-02-013
PAH	Benzo(b,k)fluoranthene	BKBFLANTH	0.6774	USEPA 2003, EPA-600-R-02-013
PAH	Benzo(e)pyrene	192-97-2	0.9008	USEPA 2003, EPA-600-R-02-013
PAH	Benzo(g,h,i)perylene	191-24-2	0.4391	USEPA 2003, EPA-600-R-02-013
PAH	Chrysene	218-01-9	2.042	USEPA 2003, EPA-600-R-02-013
PAH	Dibenzo(a,h)anthracene	53-70-3	0.2825	USEPA 2003, EPA-600-R-02-013
PAH	Fluoranthene	206-44-0	7.109	USEPA 2003, EPA-600-R-02-013
PAH	Fluorene	86-73-7	39.3	USEPA 2003, EPA-600-R-02-013
PAH	Indeno(1,2,3-c,d)pyrene	193-39-5	0.275	USEPA 2003, EPA-600-R-02-013
PAH	Naphthalene	91-20-3	193.5	USEPA 2003, EPA-600-R-02-013
PAH	Perylene	198-55-0	0.9008	USEPA 2003, EPA-600-R-02-013
PAH	Phenanthrene	85-01-8	19.13	USEPA 2003, EPA-600-R-02-013
PAH	Pyrene	129-00-0	10.11	USEPA 2003, EPA-600-R-02-013
PESTH	Aldrin	309-00-2	0.13	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
PESTH	Chlordane, alpha- (Chlordane, cis-)	5103-71-9	0.0064[a]	Ambient Water Quality Criteria for Chlordane (USEPA 1980)
PESTH	Chlordane, beta- (Chlordane, trans-)	5103-74-2	0.0064[a]	Ambient Water Quality Criteria for Chlordane (USEPA 1980)
PESTH	Dieldrin	60-57-1	0.11	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)

Table 8-4c
Porewater Chronic Threshold Values

Group	Chemical	CAS RN	Selected Chronic Threshold Value (μg/L)	Reference
PESTH	Endosulfan sulfate	1031-07-8	0.009	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
PESTH	Endosulfan, alpha- (I)	959-98-8	0.0087	NYSDEC Saline Surface Waters (NYSDEC 1998)
PESTH	Endosulfan, beta (II)	33213-65-9	0.0087	NYSDEC Saline Surface Waters (NYSDEC 1998)
PESTH	Endrin	72-20-8	0.01	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
PESTH	Heptachlor	76-44-8	0.0036	National Recommended Water Quality Criteria (USEPA 2015)
PESTH	Heptachlor epoxide	1024-57-3	0.0036	National Recommended Water Quality Criteria (USEPA 2015)
PESTH	Hexachlorobenzene	118-74-1	3.68[a]	Ambient Water Quality Criteria for Hexachlorobenzene (USEPA 1988)
PESTH	Hexachlorocyclohexane (BHC), alpha-	319-84-6	25	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
PESTH	Hexachlorocyclohexane (BHC), delta-	319-86-8	141	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
PESTH	Hexachlorocyclohexane (BHC), gamma- (Lindane)	58-89-9	0.016	USEPA Region III BTAG, Marine Screening Benchmarks (USEPA 2006a)
PESTH	Methoxychlor	72-43-5	0.03	National Recommended Water Quality Criteria (USEPA 2015)
PESTH	Mirex	2385-85-5	0.001	National Recommended Water Quality Criteria (USEPA 2015)
PESTH	Oxychlordane	27304-13-8	0.0022	USEPA Region III BTAG, Freshwater Screening Benchmarks (USEPA 2006b)
PESTH	Total DDx High Resolution (KM) (MDL)	tDDT_KM_MDL	0.007	National Recommended Water Quality Criteria (USEPA 2015)
PCBCONG	Total PCB Congener (KM) (MDL)	tPCBCong_KM_MDL	0.54[b]	Fuchsman et al. 2006

Notes:
a = The chronic threshold values used for chlordane, alpha- (Chlordane, cis-), chlordane, beta- (Chlordane, trans-), and hexachlorobenzene were revised from the surface water risk screening to be protective of aquatic life; the values in the surface water risk screening were for the protection of wildlife.
b = The chronic threshold value used for total PCB congener (KM) (MDL) was revised from the surface water risk screening to be protective of benthic invertebrates; the value used in the surface water risk screening was for the protection of wildlife.

Acronyms:
μg/L = microgram per liter
ALKPAH = alkylated polycyclic aromatic hydrocarbons
BTAG = Biological Technical Assistance Group
CAS RN = Chemical Abstracts Service Registry Number
DDx = 2,4' and 4,4'-DDD, -DDE, -DDT
KM = Kaplan-Meier
MDL = method detection limit
METDISS = metals, dissolved
NYSDEC = New York State Department of Environmental Conservation
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PCBCONG = PCB congeners
PESTH = pesticides – high resolution
SL = screening level
USEPA = U.S. Environmental Protection Agency

References:
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Table 8-7
Sediment Bioassay Reference Envelope Evaluation Using Lower 95% Confidence Interval of 5th Percentile

Location ID	Area	28-day Percent Survival*		28-day Growth (biomass)		28-day Growth (weight)		28-day Reproduction per Surviving Amphipod		28-day Reproduction per Surviving Female Amphipod		10-day Percent Survival*	
		Control-Adjusted % Response	Significant Difference from Control	Control-Adjusted % Response	Significant Difference from Control	Control-Adjusted % Response	Significant Difference from Control	Control-Adjusted % Response	Significant Difference from Control	Control-Adjusted % Response	Significant Difference from Control	Control-Adjusted % Response	Significant Difference from Control
NC153SG	Newtown Creek	76.56	NSD	78.59	NSD	104.42	NSD	38.51	NSD	37.96	NSD	70.33	SD
NC154SG	Newtown Creek	95.45	NSD	91.12	NSD	97.86	NSD	59.38	NSD	51.33	NSD	83.33	NSD
NC156SG	Newtown Creek	83.59	NSD	72.99	NSD	89.32	NSD	42.77	NSD	46.78	NSD	34.07	SD
NC158SG	Newtown Creek	78.13	NSD	73.25	NSD	94.73	NSD	21.06	NSD	30.50	NSD	49.45	SD
NC013SG	Newtown Creek	77.27	NSD	62.97	NSD	79.82	NSD	25.34	SD	31.51	NSD	25.56	SD
NC161SG	Newtown Creek	90.15	NSD	93.83	NSD	108.00	NSD	68.09	NSD	64.60	NSD	67.78	SD
NC162SG	Newtown Creek	75.00	NSD	45.21	SD	58.18	NSD	7.45	NSD	6.70	SD	42.86	SD
DK001SG	Dutch Kills	88.64	NSD	102.98	NSD	119.60	NSD	48.74	NSD	45.58	NSD	65.56	SD
NC164SG	Newtown Creek	96.21	NSD	96.13	NSD	101.76	NSD	46.03	NSD	34.73	NSD	62.22	SD
NC037SG	Newtown Creek	77.34	NSD	69.79	NSD	90.27	NSD	33.83	NSD	40.19	NSD	58.24	SD
NC165SG	Newtown Creek	96.97	NSD	118.74	NSD	122.99	NSD	67.12	NSD	60.23	NSD	36.67	SD
NC046SG	Newtown Creek	86.72	NSD	83.97	NSD	99.23	NSD	48.72	NSD	40.59	NSD	41.21	SD
NC167SG	Newtown Creek	60.16	SD	50.69	SD	88.95	NSD	12.98	NSD	18.65	NSD	16.48	SD
NC168SG	Newtown Creek	66.41	SD	63.54	NSD	98.42	NSD	15.53	NSD	19.62	NSD	29.67	SD
NC169SG	Newtown Creek	76.56	NSD	63.57	NSD	81.85	NSD	15.96	NSD	18.45	NSD	47.25	SD
NC065SG	Newtown Creek	42.97	SD	28.83	SD	61.62	NSD	2.98	SD	8.08	SD	29.67	SD
NC174SG	Newtown Creek	0.00	SD	0.00	SD	0.00	SD	0.00	SD	0.00	SD	0.00	SD
NC071SG	Newtown Creek	0.00	SD	0.00	SD	0.00	SD	0.00	SD	0.00	SD	0.00	SD
MC017SG	Maspeth Creek	15.91	SD	1.68	SD	15.40	SD	2.32	SD	0.00	SD	17.78	SD
MC005SG	Maspeth Creek	25.76	SD	5.12	SD	27.90	SD	4.06	SD	23.89	SD	6.67	SD
MC023SG	Maspeth Creek	7.03	SD	2.31	SD	30.25	SD	0.21	SD	0.00	SD	9.89	SD
NC293SG	Newtown Creek	0.78	SD	-0.50	SD	3.24	SD	0.43	SD	0.00	SD	5.49	SD
NC180SG	Newtown Creek	5.47	SD	1.20	SD	10.38	SD	0.43	SD	1.21	SD	3.30	SD
EB006SG	East Branch	9.85	SD	2.71	SD	21.33	SD	0.39	SD	2.05	SD	5.56	SD
EB036SG	East Branch	8.59	SD	-0.29	SD	14.51	SD	4.47	SD	0.81	SD	5.49	SD
NC181SG	English Kills	12.88	SD	1.31	SD	13.85	SD	1.16	SD	0.00	SD	6.67	SD
EK057SG	English Kills	9.09	SD	-0.12	SD	6.00	SD	0.58	SD	1.37	SD	0.00	SD
EK006SG	English Kills	3.03	SD	0.96	SD	20.53	SD	0.00	SD	0.00	SD	1.11	SD
EK059SG	English Kills	1.52	SD	1.49	SD	14.49	SD	0.00	SD	0.00	SD	0.00	SD
EK065SG	English Kills	6.82	SD	-0.04	SD	8.75	SD	0.00	SD	0.00	SD	5.56	SD
EK072SG	English Kills	8.33	SD	0.72	SD	16.14	SD	2.51	SD	15.02	SD	3.33	SD
EK076SG	English Kills	0.00	SD	0.00	SD	0.00	SD	0.00	SD	0.00	SD	5.49	SD
DK040SG	Dutch Kills	13.28	SD	4.57	SD	18.89	SD	0.00	SD	0.00	SD	2.20	SD
DK037SG	Dutch Kills	12.88	SD	3.28	SD	31.01	SD	0.77	SD	1.82	SD	12.22	SD
WC010SG	Whale Creek	54.69	SD	52.37	SD	95.71	NSD	18.09	NSD	21.41	NSD	21.98	SD
WC012SG	Whale Creek	64.39	SD	30.86	SD	48.40	SD	6.19	SD	6.48	SD	11.11	SD

Notes:

Green shading indicates values greater than or equal to the reference envelope threshold.

Orange shading indicates shading indicates values less than the reference envelope threshold.

* = For determining statistical difference from control, percent survival data were transformed using the arcsine of the square root of the value.

Reference envelope threshold determined based on the lower 95% confidence interval on the 5th percentile of best fit distribution.

Acronyms:

NSD = no significant difference

SD = significant difference

Table 8-9
Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations

Contingency Tables with All Data[1] 28-Day Survival				Contingency Table with Confounding Factor Stations Removed[2] 28-Day Survival			
Sum Peeper Metals+SPME PAH TU>1							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<1	2,2.41	31,37.35	33,39.76	TU<1	0,0.00	29,40.28	29,40.28
TU>1	19,22.89	31,37.35	50,60.24	TU>1	12,16.67	31,43.06	43,59.72
Total	21,25.30	62,74.70	83	Total	12,16.67	60,83.33	72
Sum Peeper Metals+SPME PAH TU>2							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<2	8,9.64	57,68.67	65,78.31	TU<2	0,0.00	55,76.39	55,76.39
TU>2	13,15.66	5,6.02	18,21.69	TU>2	12,16.67	5,6.94	17,23.61
Total	21,25.30	62,74.70	83	Total	12,16.67	60,83.33	72
Sum Peeper Metals+SPME PAH TU>4.1							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<4.1	9,10.84	61,73.49	70,84.34	TU<4.1	0,0.00	59,81.94	59,81.94
TU>4.1	12,14.46	1,1.20	13,15.66	TU>4.1	12,16.67	1,1.39	13,18.06
Total	21,25.30	62,74.70	83	Total	12,16.67	60,83.33	72

Contingency Tables with All Data[1] 28-Day Biomass				Contingency Table with Confounding Factor Stations Removed[2] 28-Day Biomass			
Sum Peeper Metals+SPME PAH TU>1							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<1	3,3.61	30,36.14	33,39.76	TU<1	1,1.39	28,38.89	29,40.28
TU>1	23,27.71	27,32.53	50,60.24	TU>1	16,22.22	27,37.50	43,59.72
Total	26,31.33	57,68.67	83	Total	17,23.61	55,76.39	72
Sum Peeper Metals+SPME PAH TU>2							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<2	10,12.05	55,66.27	65,78.31	TU<2	2,2.78	53,73.61	55,76.39
TU>2	16,19.28	2,2.41	18,21.69	TU>2	15,20.83	2,2.78	17,23.61
Total	26,31.33	57,68.67	83	Total	17,23.61	55,76.39	72
Sum Peeper Metals+SPME PAH TU>3.4							
Count,Total %	**Hit**	**No Hit**	**Total**	**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<3.4	10,12.05	59,71.08	69,83.13	TU<3.4	1,1.39	57,79.17	58,80.56
TU>3.4	13,15.66	1,1.20	14,16.87	TU>3.4	13,18.06	1,1.39	14,19.44
Total	23,27.71	60,72.29	83	Total	14,19.44	58,80.56	72

Table 8-9
Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations

Contingency Tables with All Data[1] / **Contingency Table with Confounding Factor Stations Removed[2]**

28-Day Weight / ***28-Day Weight***

Sum Peeper Metals+SPME PAH TU>1

Count,Total %	Hit	No Hit	Total		Count,Total %	Hit	No Hit	Total
TU<1	3,3.61	30,36.14	33,39.76		TU<1	1,1.39	28,38.89	29,40.28
TU>1	23,27.71	27,32.53	50,60.24		TU>1	16,22.22	27,37.50	43,59.72
Total	26,31.33	57,68.67	83		Total	17,23.61	55,76.39	72

Sum Peeper Metals+SPME PAH TU>2

Count,Total %	Hit	No Hit	Total		Count,Total %	Hit	No Hit	Total
TU<2	10,12.05	55,66.27	65,78.31		TU<2	2,2.78	53,73.61	55,76.39
TU>2	16,19.28	2,2.41	18,21.69		TU>2	15,20.83	2,2.78	17,23.61
Total	26,31.33	57,68.67	83		Total	17,23.61	55,76.39	72

Sum Peeper Metals+SPME PAH TU>4.8

Count,Total %	Hit	No Hit	Total		Count,Total %	Hit	No Hit	Total
TU<4.8	10,12.05	55,66.27	65,78.31		TU<4.8	1,1.39	58,80.56	59,81.94
TU>4.8	16,19.28	2,2.41	18,21.69		TU>4.8	12,16.67	1,1.39	13,18.06
Total	26,31.33	57,68.67	83		Total	13,18.06	59,81.94	72

Contingency Tables with All Data[1] / **Contingency Table with Confounding Factor Stations Removed[2]**

28-Day Reproduction per Amphipod[3] / ***28-Day Reproduction per Amphipod[3]***

Sum Peeper Metals+SPME PAH TU>1

Count,Total %	Hit	No Hit	Total		Count,Total %	Hit	No Hit	Total
TU<1	2,2.41	31,37.35	33,39.76		TU<1	0,0.00	29,40.28	29,40.28
TU>1	19,22.89	31,37.35	50,60.24		TU>1	13,18.06	30,41.67	43,59.72
Total	21,25.30	62,74.70	83		Total	13,18.06	59,81.94	72

Sum Peeper Metals+SPME PAH TU>2

Count,Total %	Hit	No Hit	Total		Count,Total %	Hit	No Hit	Total
TU<2	7,8.43	58,69.88	65,78.31		TU<2	0,0.00	55,76.39	55,76.39
TU>2	14,16.87	4,4.82	18,21.69		TU>2	13,18.06	4,5.56	17,23.61
Total	21,25.30	62,74.70	83		Total	13,18.06	59,81.94	72

Table 8-9
Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations

Contingency Tables with All Data[1] *28-Day Reproduction per Female Amphipod*					Contingency Table with Confounding Factor Stations Removed[2] *28-Day Reproduction per Female Amphipod*[3]			
Sum Peeper Metals+SPME PAH TU>1								
Count,Total %	**Hit**	**No Hit**	**Total**		**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<1	2,2.41	31,37.35	33,39.76		TU<1	0,0.00	29,40.28	29,40.28
TU>1	20,24.10	30,36.14	50,60.24		TU>1	14,19.44	29,40.28	43,59.72
Total	22,26.51	61,73.49	83		Total	14,19.44	58,80.56	72
Sum Peeper Metals+SPME PAH TU>2								
Count,Total %	**Hit**	**No Hit**	**Total**		**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<2	7,8.43	58,69.88	65,78.31		TU<2	0,0.00	55,76.39	55,76.39
TU>2	15,18.07	3,3.61	18,21.69		TU>2	14,19.44	3,4.17	17,23.61
Total	22,26.51	61,73.49	83		Total	14,19.44	58,80.56	72

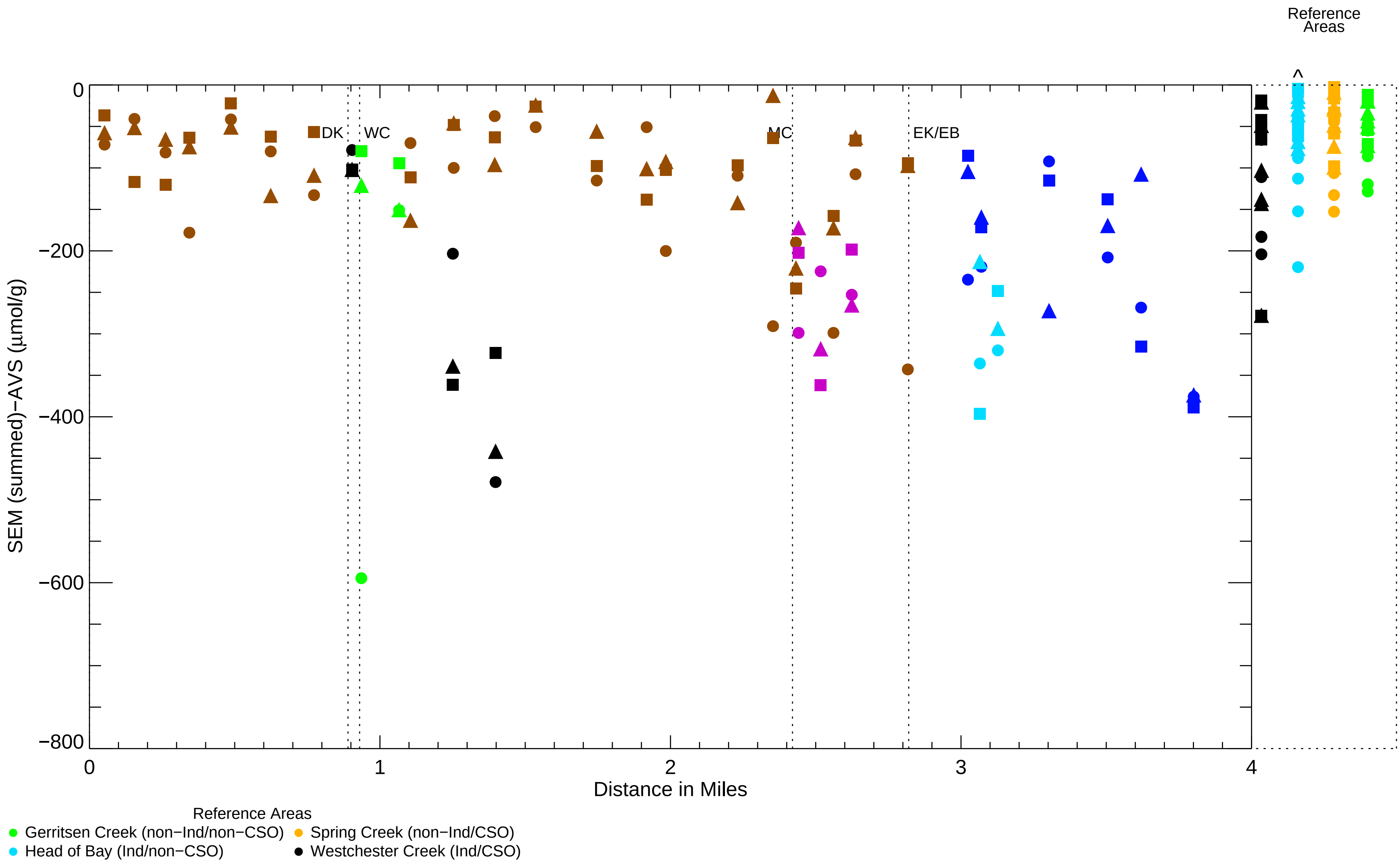
Contingency Tables with All Data[1] *10-Day Survival*					Contingency Table with Confounding Factor Stations Removed[2] *10-Day Survival*			
Sum Peeper Metals+SPME PAH TU>1								
Count,Total %	**Hit**	**No Hit**	**Total**		**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<1	5,6.02	28,33.73	33,39.76		TU<1	3,4.17	26,36.11	29,40.28
TU>1	27,32.53	23,27.71	50,60.24		TU>1	20,27.78	23,31.94	43,59.72
Total	32,38.55	51,61.45	83		Total	23,31.94	49,68.06	72
Sum Peeper Metals+SPME PAH TU>2								
Count,Total %	**Hit**	**No Hit**	**Total**		**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<2	16,19.28	49,59.04	65,78.31		TU<2	8,11.11	47,65.28	55,76.39
TU>2	16,19.28	2,2.41	18,21.69		TU>2	15,20.83	2,2.78	17,23.61
Total	32,38.55	51,61.45	83		Total	23,31.94	49,68.06	72
Sum Peeper Metals+SPME PAH TU>2.7								
Count,Total %	**Hit**	**No Hit**	**Total**		**Count,Total %**	**Hit**	**No Hit**	**Total**
TU<2.7	18,21.69	51,61.45	69,83.13		TU<2.7	9,12.50	49,68.06	58,80.56
TU>2.7	14,16.87	0,0.00	14,16.87		TU>2.7	14,19.44	0,0.00	14,19.44
Total	32,38.55	51,61.45	83		Total	23,31.94	49,68.06	72

Table 8-9
Summary of Concentration-Response Prediction Error Rates with or without Confounding Factor Stations

Notes:
1 = All data include 48 reference area and 35 Study Area bioassay test samples. SPME PAH sample data were not available for Station NC013SG; these data were not included in the contingency evaluation.
2 = Stations removed as confounding factors due to C19-C36 aliphatic concentrations include: NC065, DK037, DK040, EB006, EB036, MC005, MC017, WE012, and WE014. Reference area samples include both bioassay batch results for a total of 11 stations removed.
3 = A logistic regression curve could not be fitted to the reproduction by amphipod endpoint.

	Gray shading indicates a false negative result.
	Green shading indicates a correct result.
	Blue shading indicates a false positive result.

Acronyms:
PAH = polycyclic aromatic hydrocarbon
SPME = solid-phase microextraction
TU = toxic unit



Newtown Creek
Dutch Kills
Whale Creek
Maspeth Creek
English Kills
East Branch

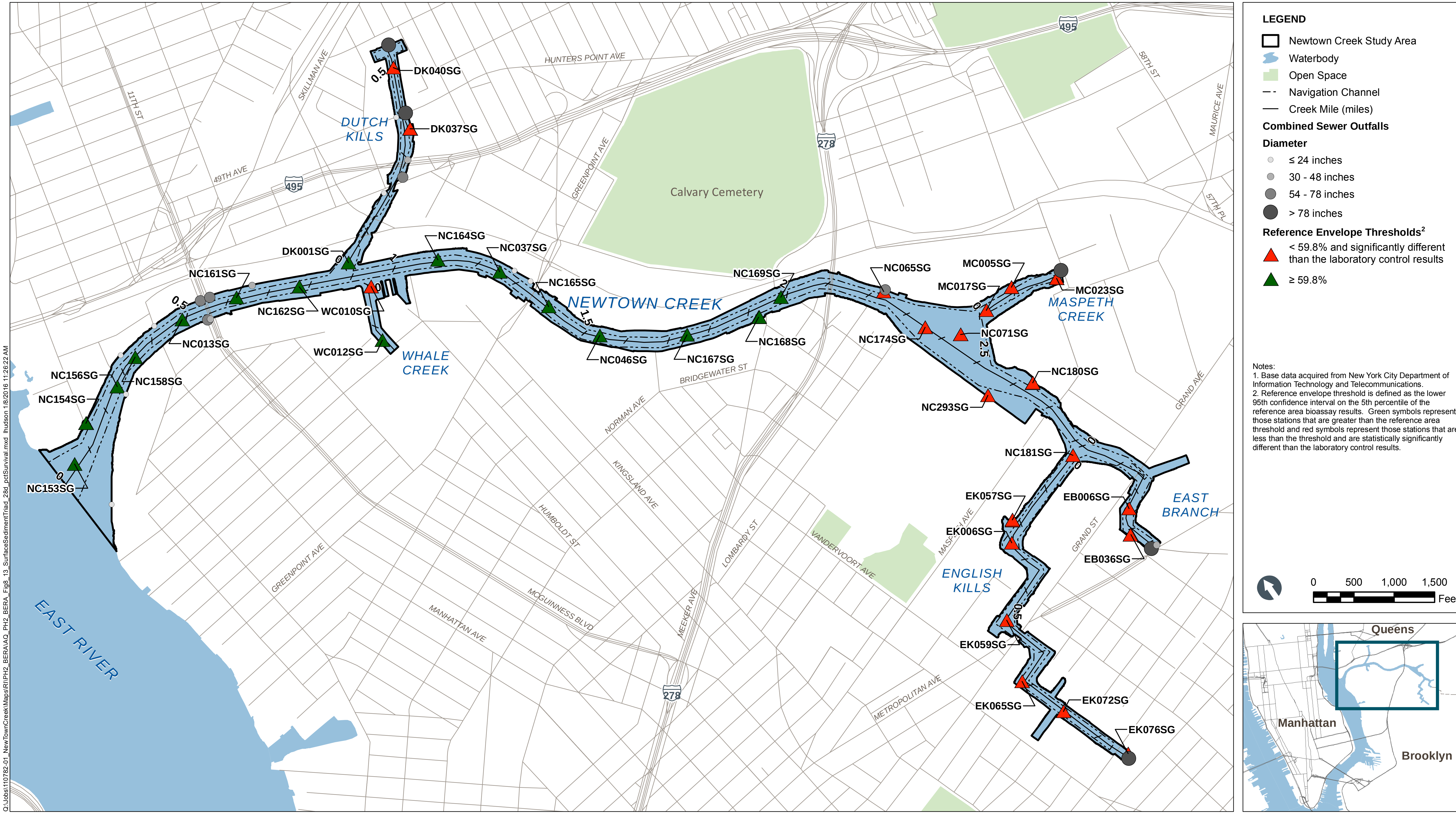
In Situ
Pre−Test
Post−Test

Figure E1-1

Simultaneously Extracted Metals (Summed) − Acid Volatile Sulfide
in Study Area and Reference Areas − Phase 2
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Notes: Non−detects included at method detection limit and plotted with an open symbol only where all values used in calculation were non−detects. Data Bins: NCP2_SurfaceSediment_wKM_20151207.bin

LHB/EG/CF − \\austin2\D_drive\Projects\Newtown_Creek\Data_Review\Sediment\IDL\surfsed_spatial_wallRefAreas_SEMonAVS_wPrePostTest_20150814.pro Thu Jan 21 10:19:28 2016



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ANCHOR QEA

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Figure 8-13
28-day Survival Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

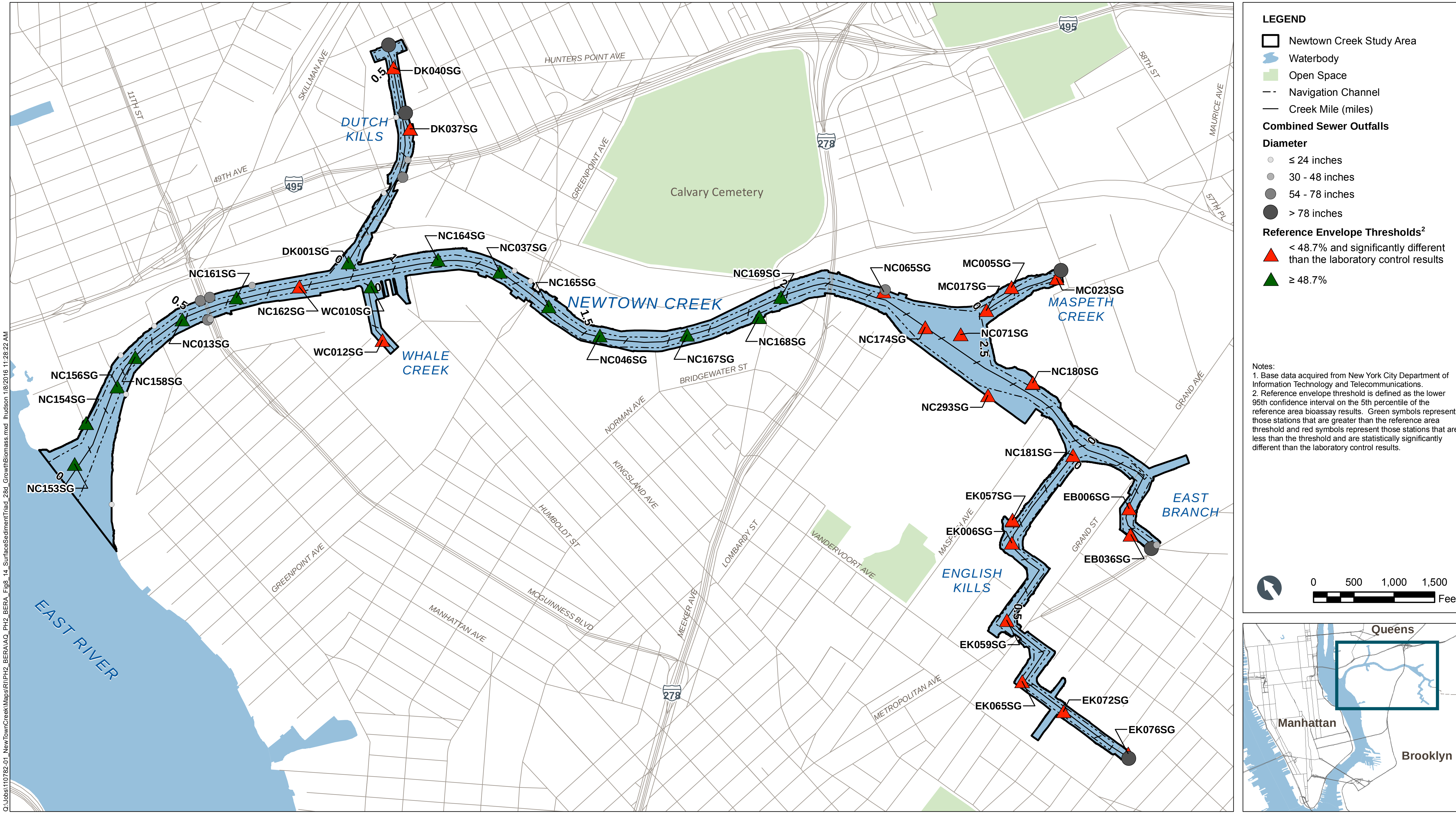

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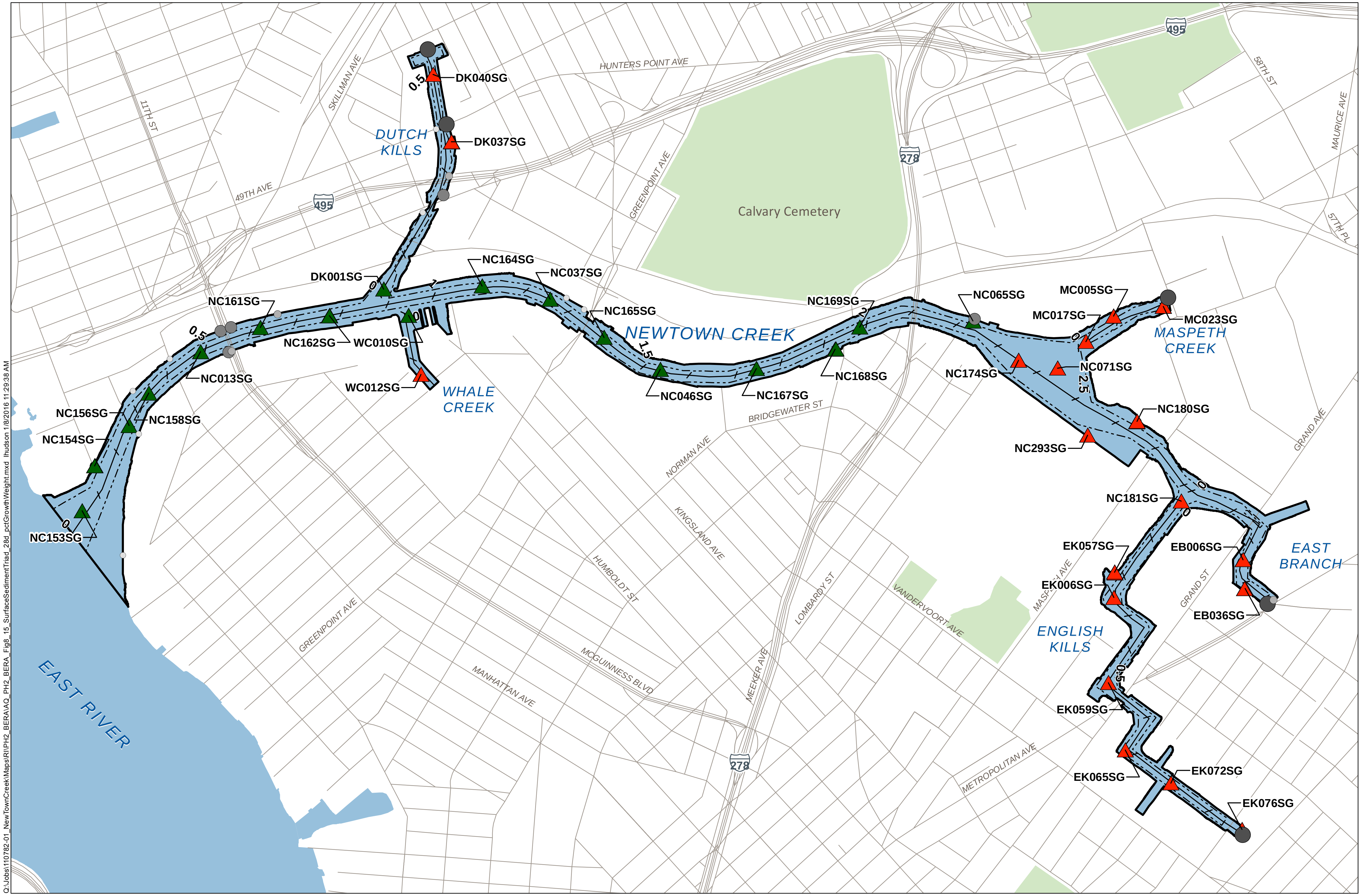
Figure 8-14
28-day Growth (Biomass) Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



LEGEND

- Newtown Creek Study Area
- Waterbody
- Open Space
- Navigation Channel
- Creek Mile (miles)

Combined Sewer Outfalls

Diameter

- ≤ 24 inches
- 30 - 48 inches
- 54 - 78 inches
- > 78 inches

Reference Envelope Thresholds[2]

- < 61.8% and significantly different than the laboratory control results
- ≥ 61.8%

Notes:
1. Base data acquired from New York City Department of Information Technology and Telecommunications.
2. Reference envelope threshold is defined as the lower 95th confidence interval on the 5th percentile of the reference area bioassay results. Green symbols represent those stations that are greater than the reference area threshold and red symbols represent those stations that are less than the threshold and are statistically significantly different than the laboratory control results.

0 500 1,000 1,500 Feet

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Figure 8-15
28-day Growth (Weight) Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

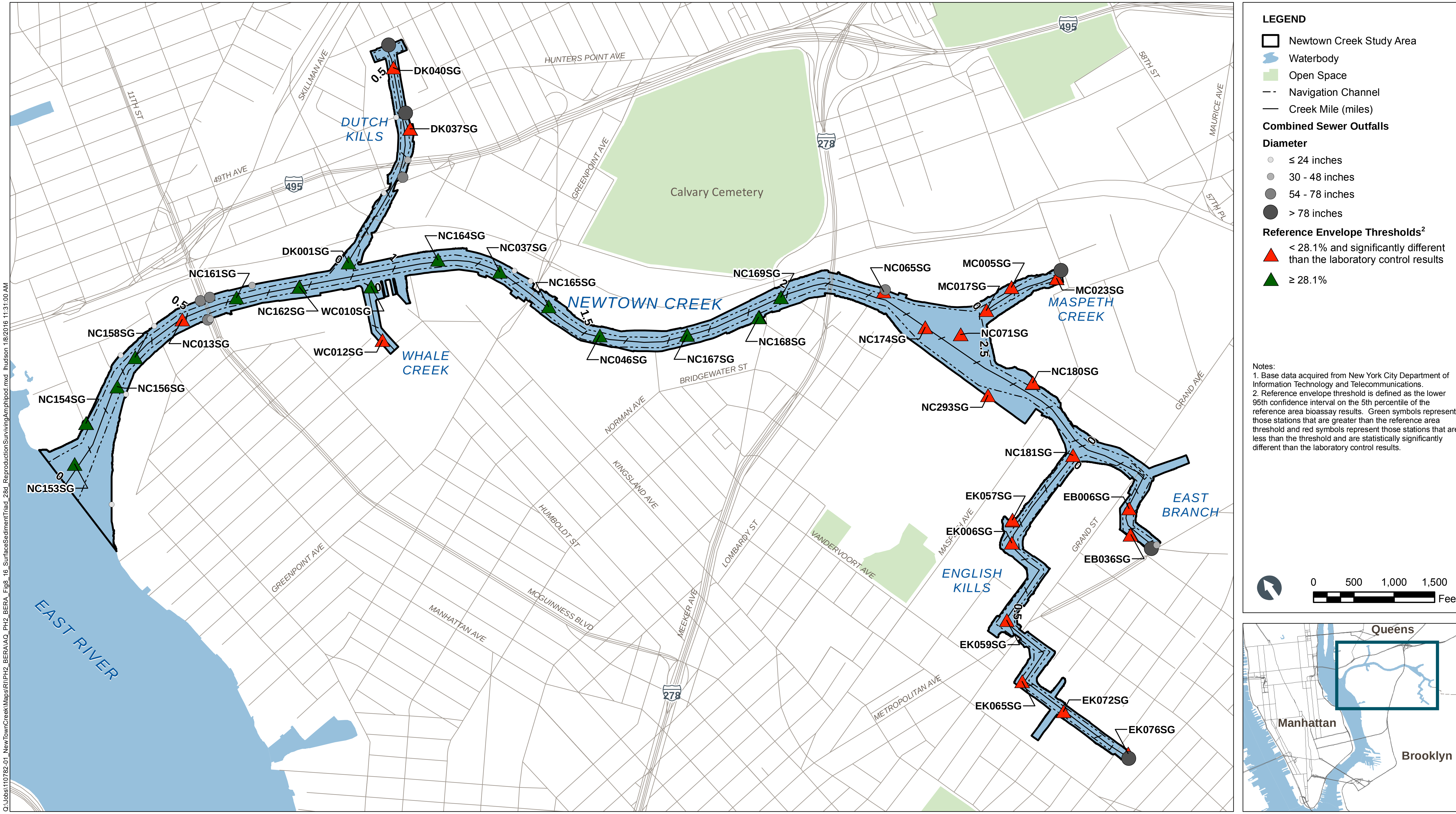

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Figure 8-16
28-day Reproduction (Per Surviving Amphipod) Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

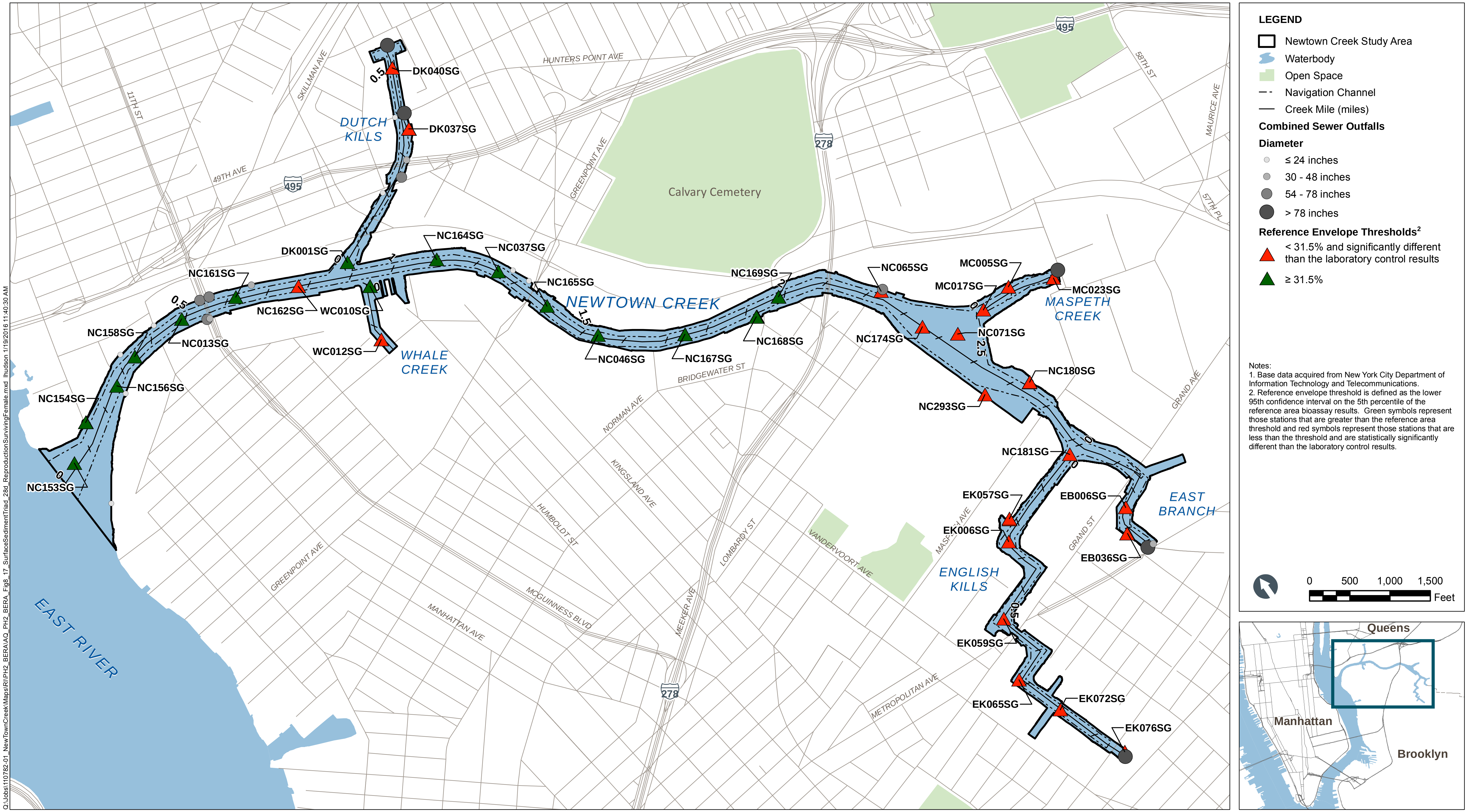

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Figure 8-17
28-day Reproduction (Per Surviving Female) Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

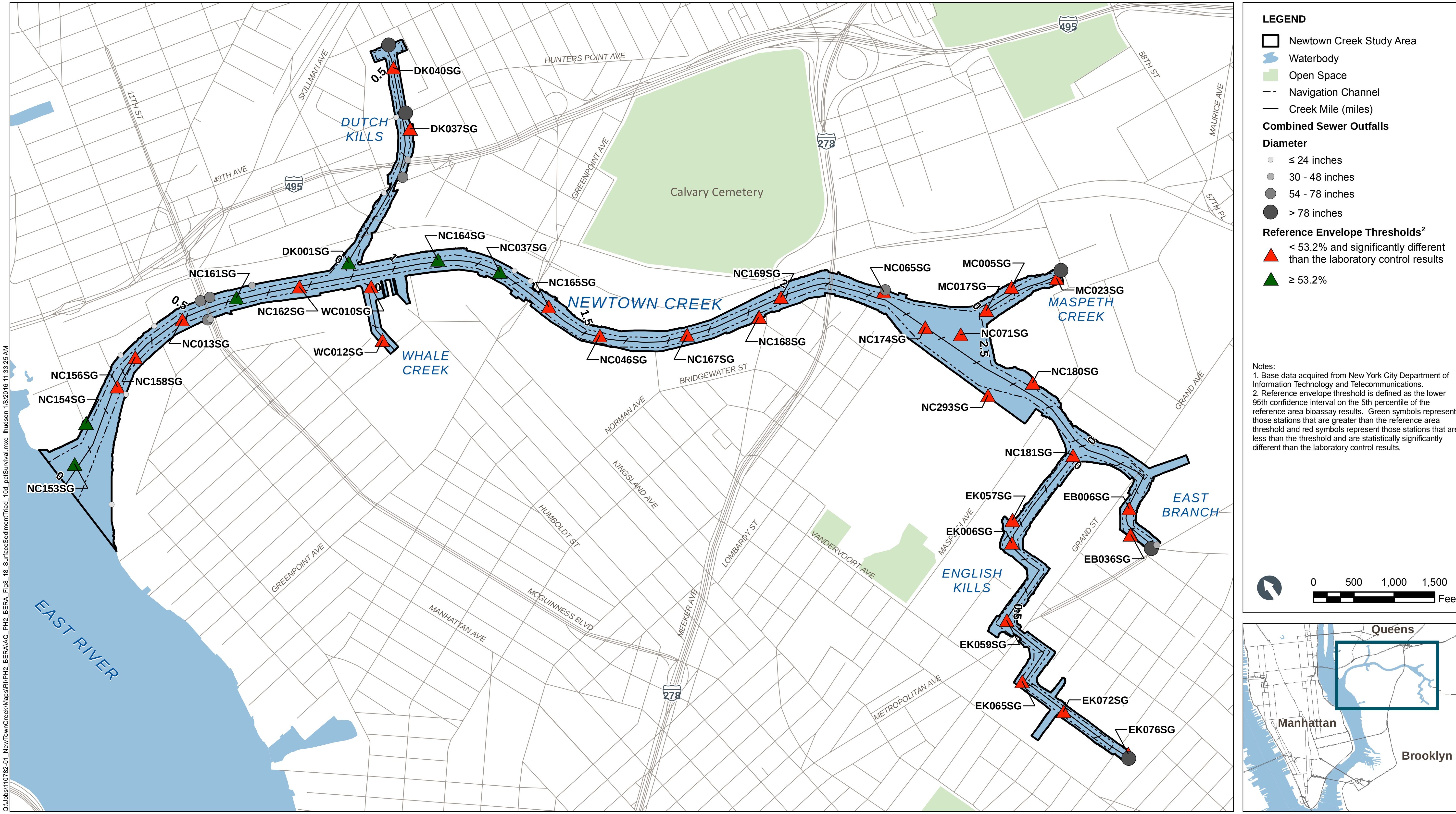

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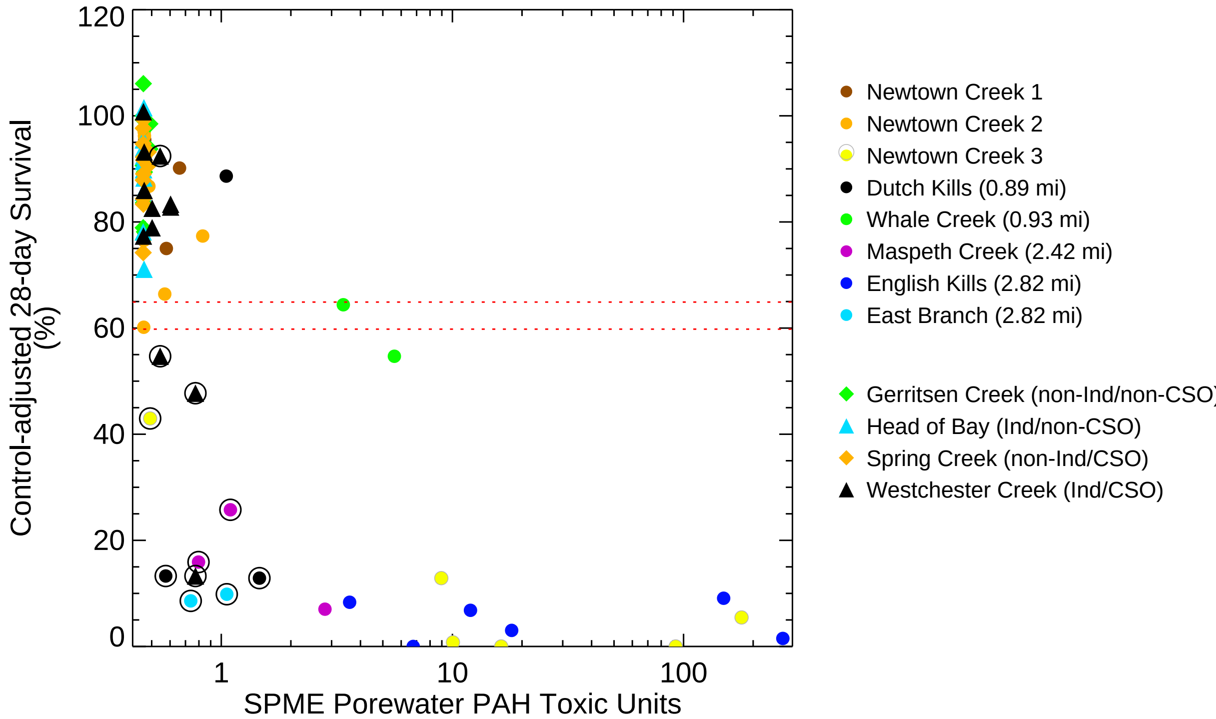
Figure 8-18
10-day Survival Reference Envelope Comparison by Study Area Creek Mile
Baseline Ecological Risk Assessment
Newtown Creek RI/FS



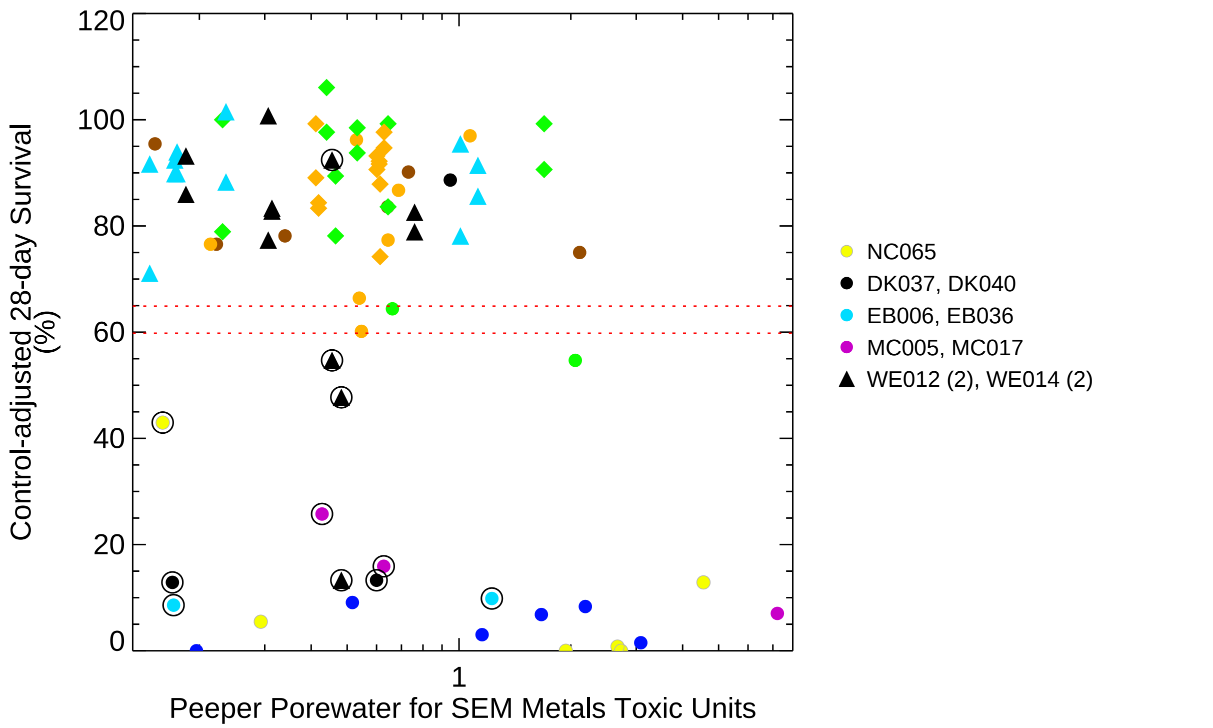
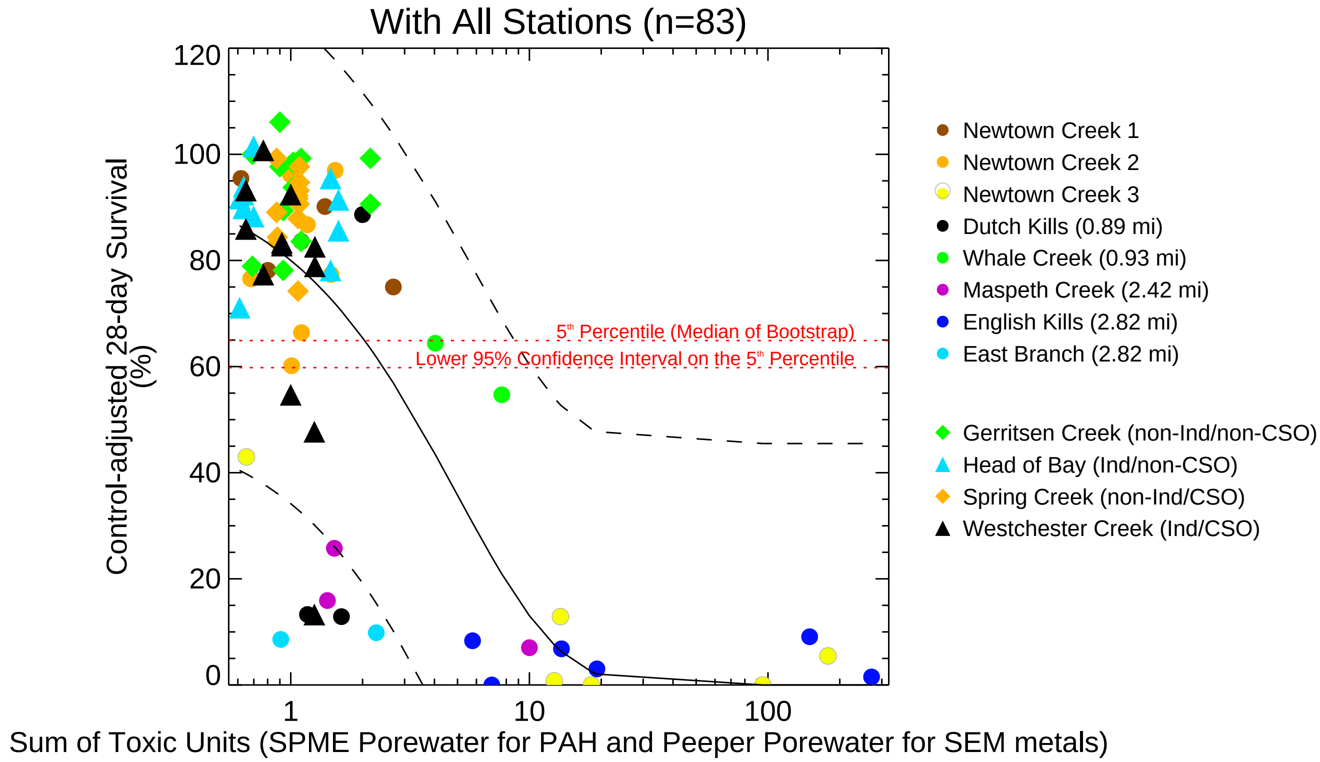
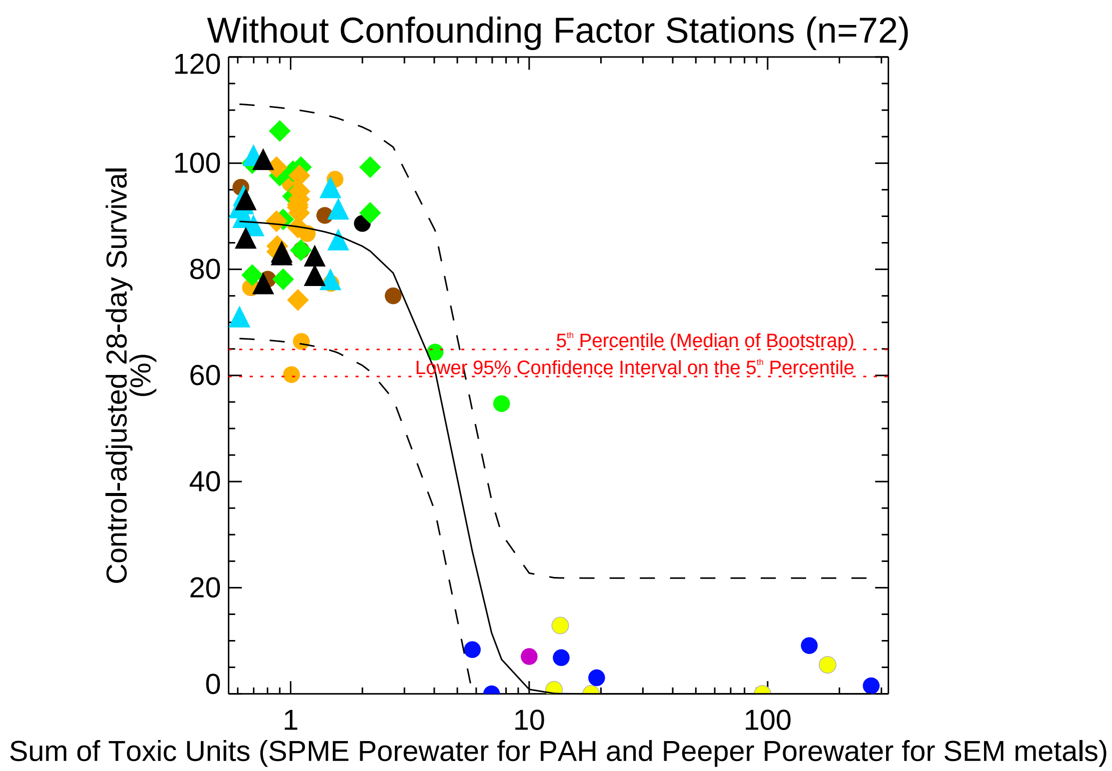


Figure 8-19a

Leptocheirus Concentration-Response - Control-adjusted 28-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv





ANCHOR QEA

Figure 8-19b

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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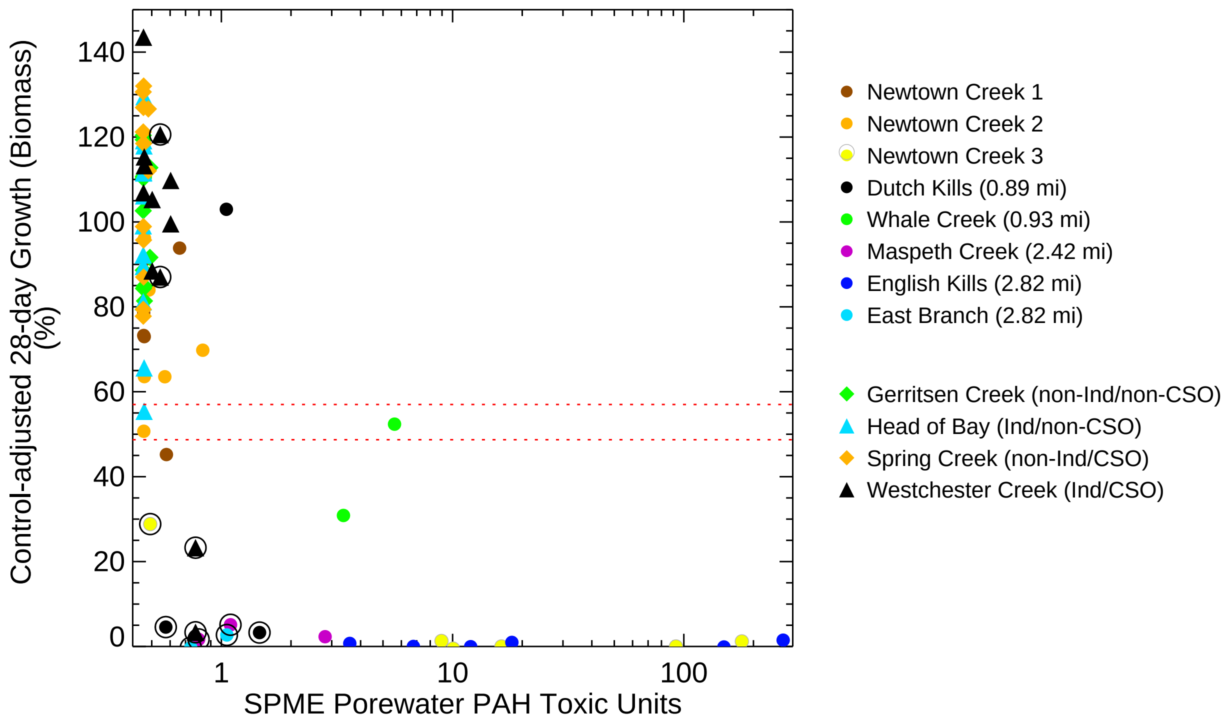


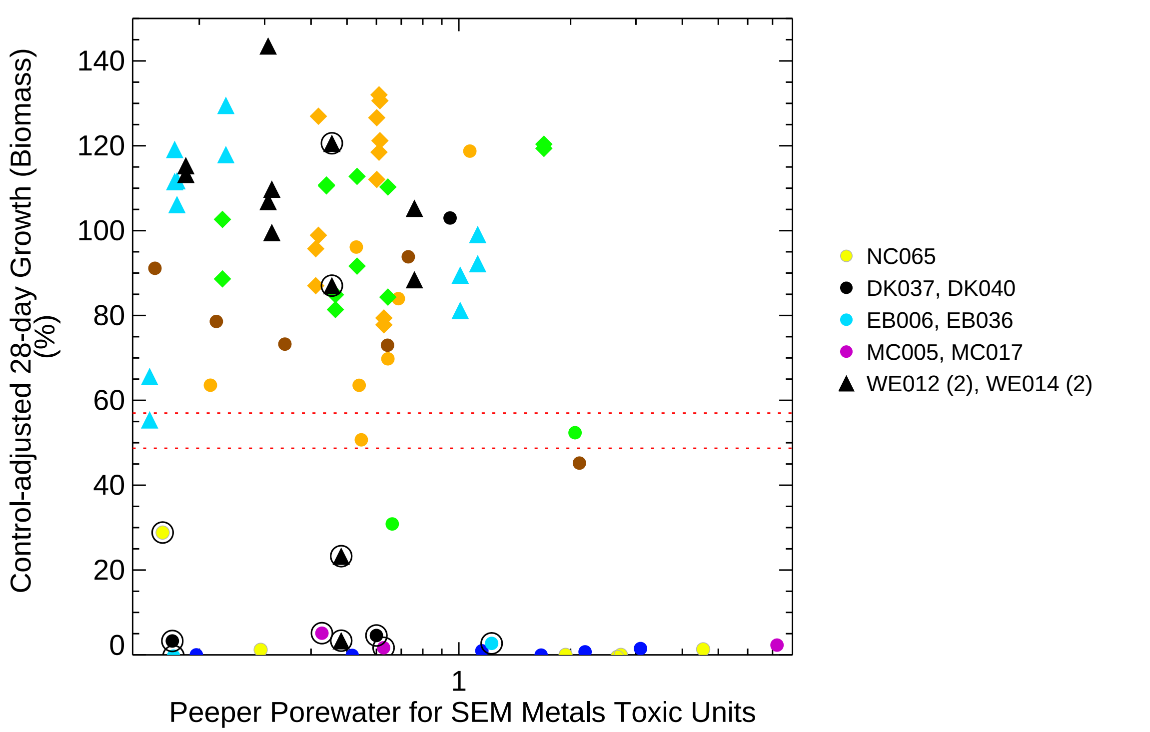
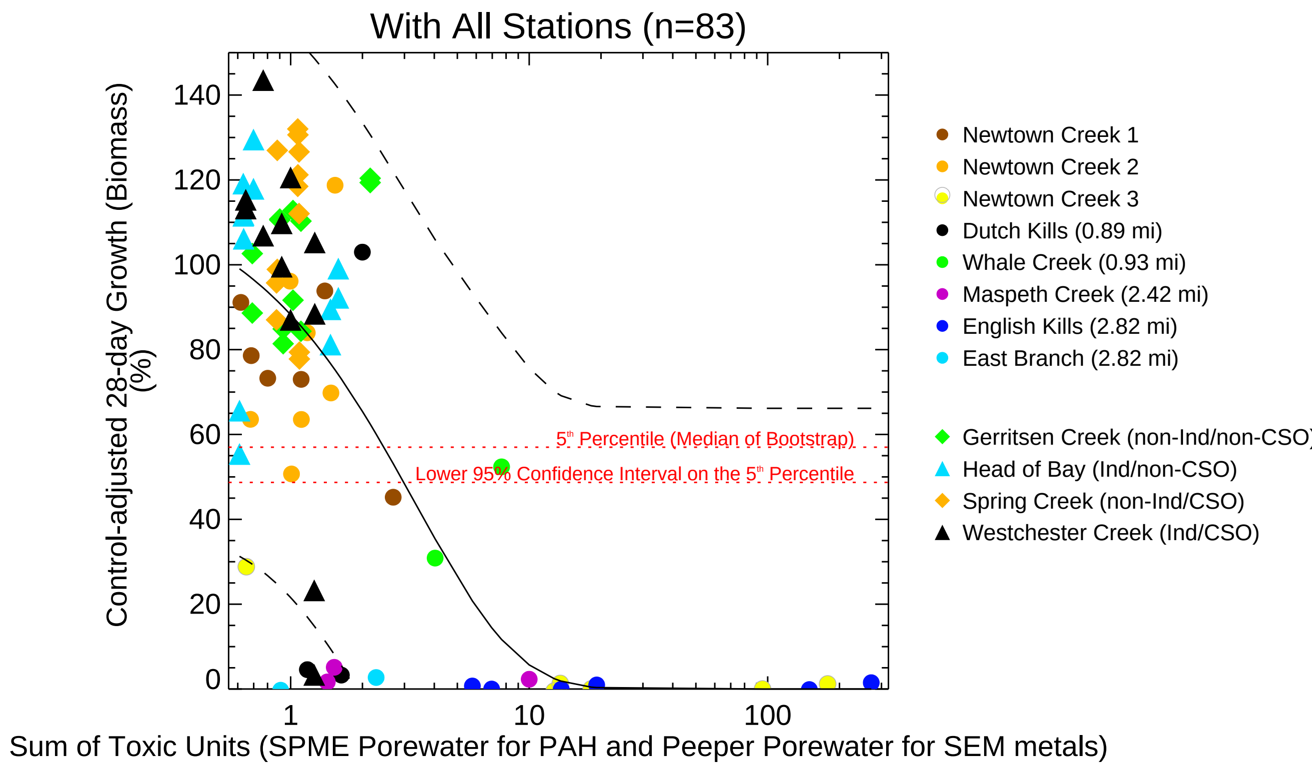


Figure 8-20a

Leptocheirus Concentration-Response - Control-adjusted 28-day Growth (Biomass)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Biomass_Bioassay_PW_PAH_SEM-Metal_noNC013.csv



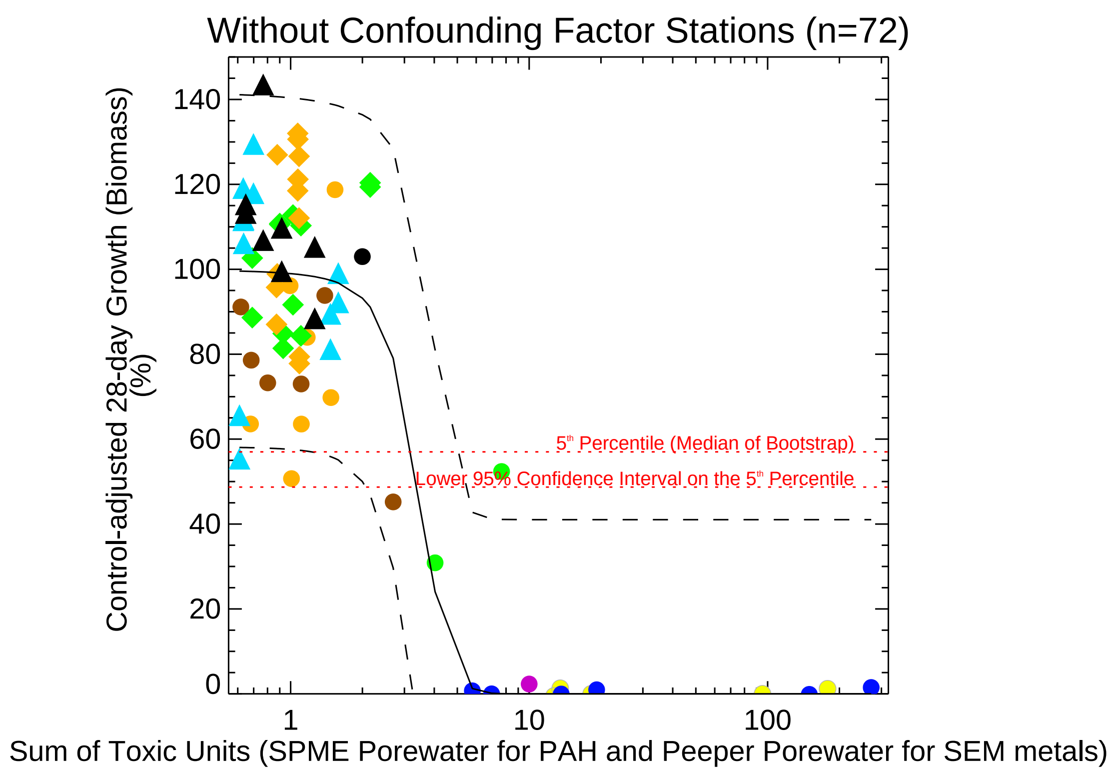


Figure 8-20b

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Growth (Biomass)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

ANCHOR QEA

Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_Biomass_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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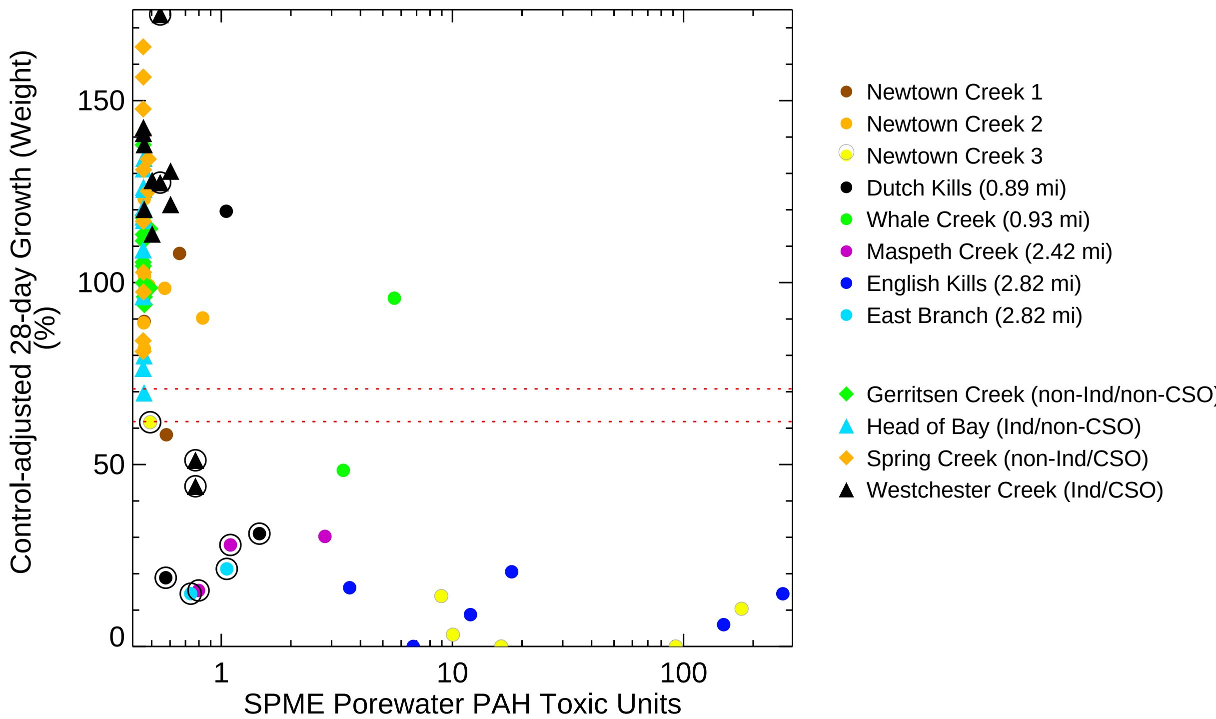


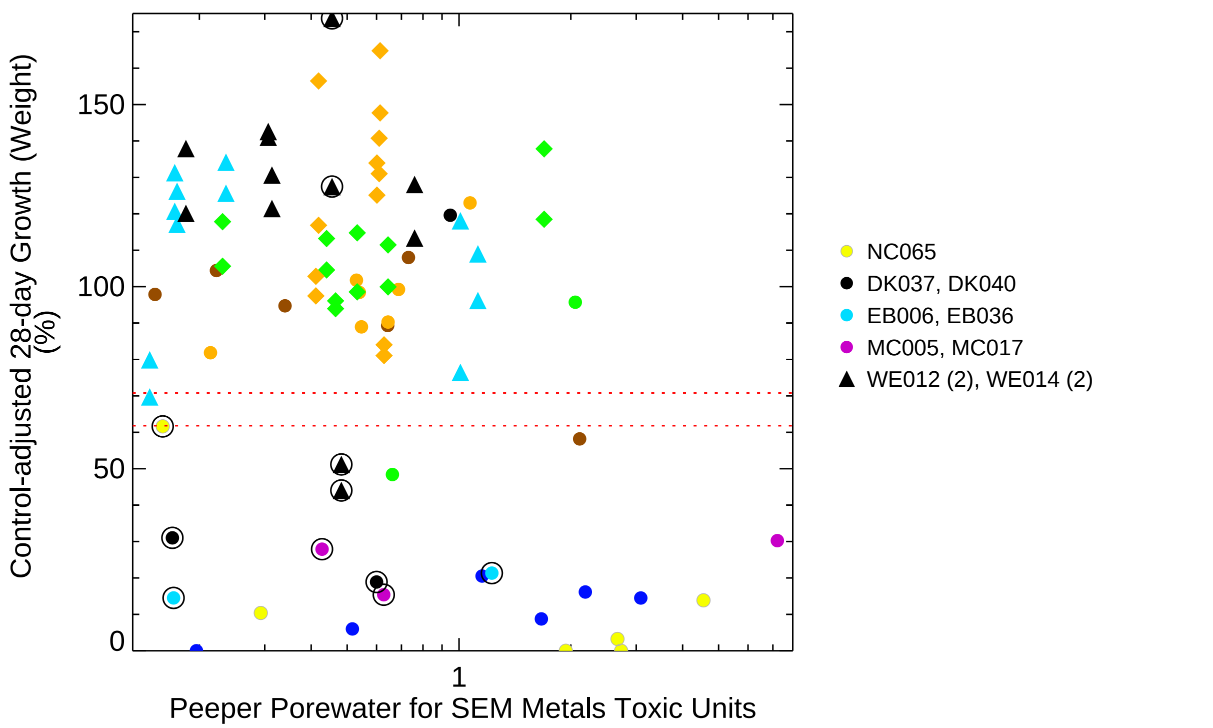
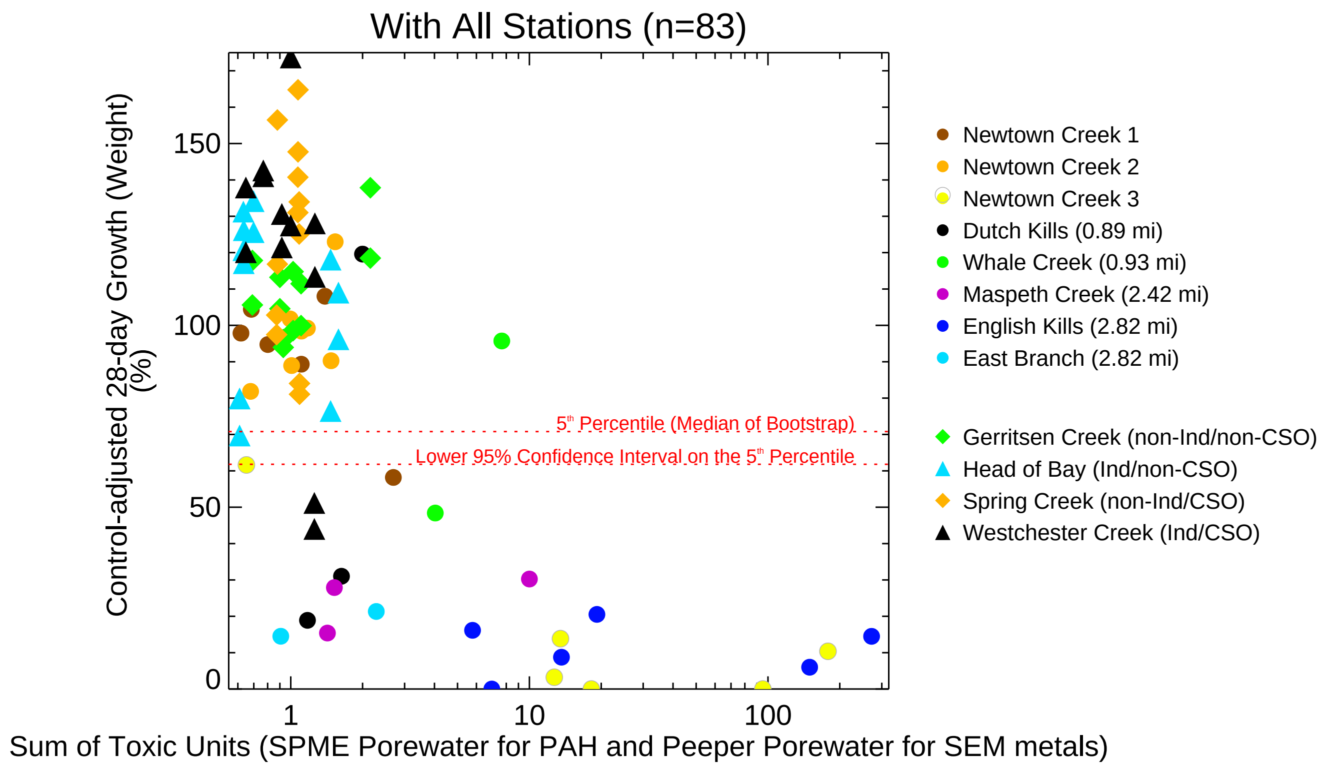


Figure 8-21a

Leptocheirus Concentration-Response - Control-adjusted 28-day Growth (Weight)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

ANCHOR QEA

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_Weight_Bioassay_PW_PAH_SEM-Metal_noNC013.csv



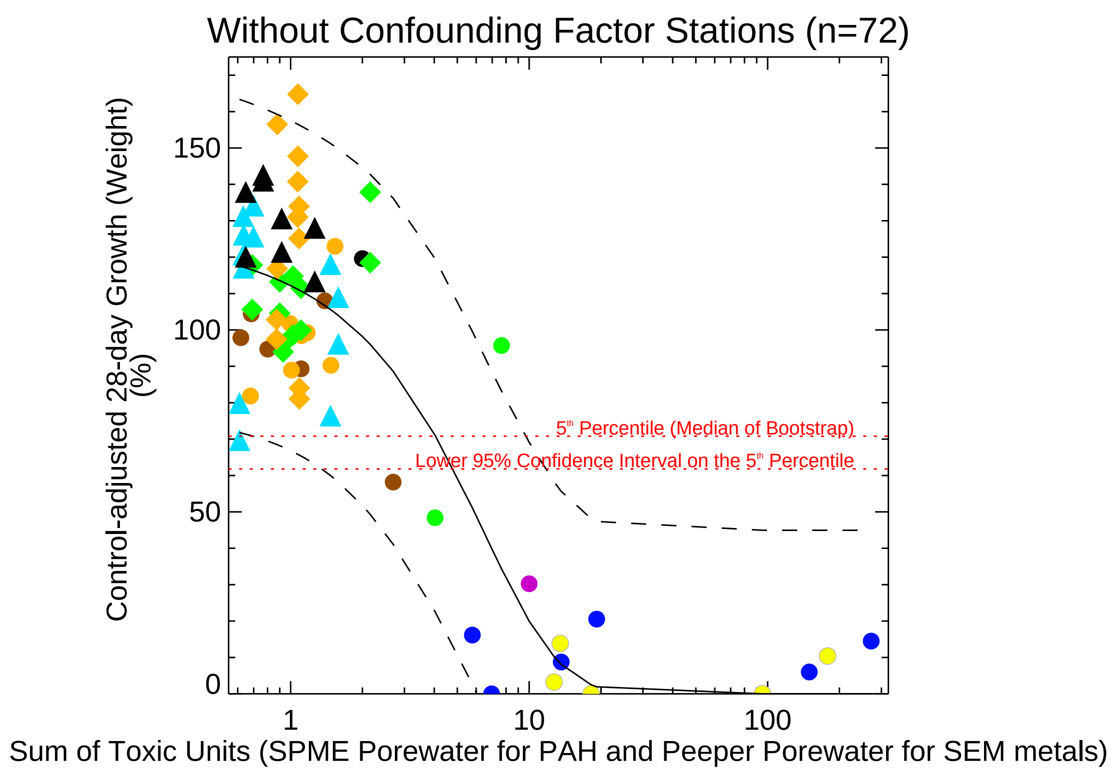


Figure 8-21b

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Growth (Weight)
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

ANCHOR QEA

Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_Weight_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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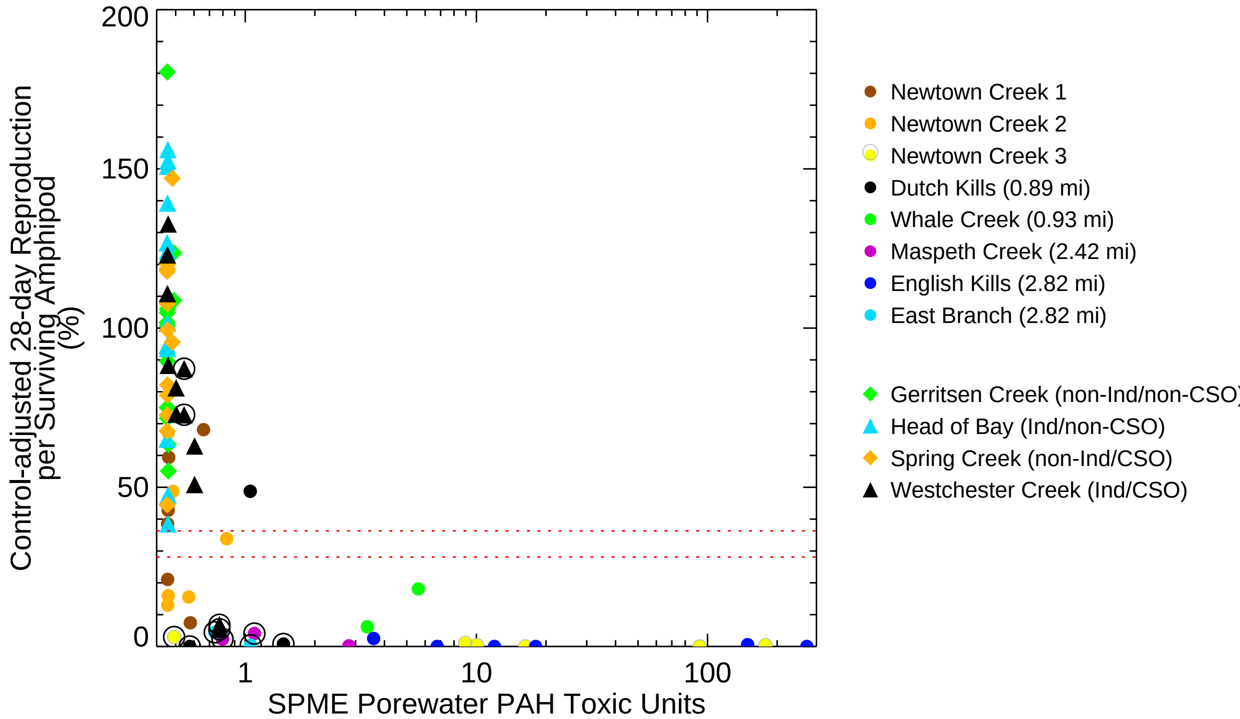


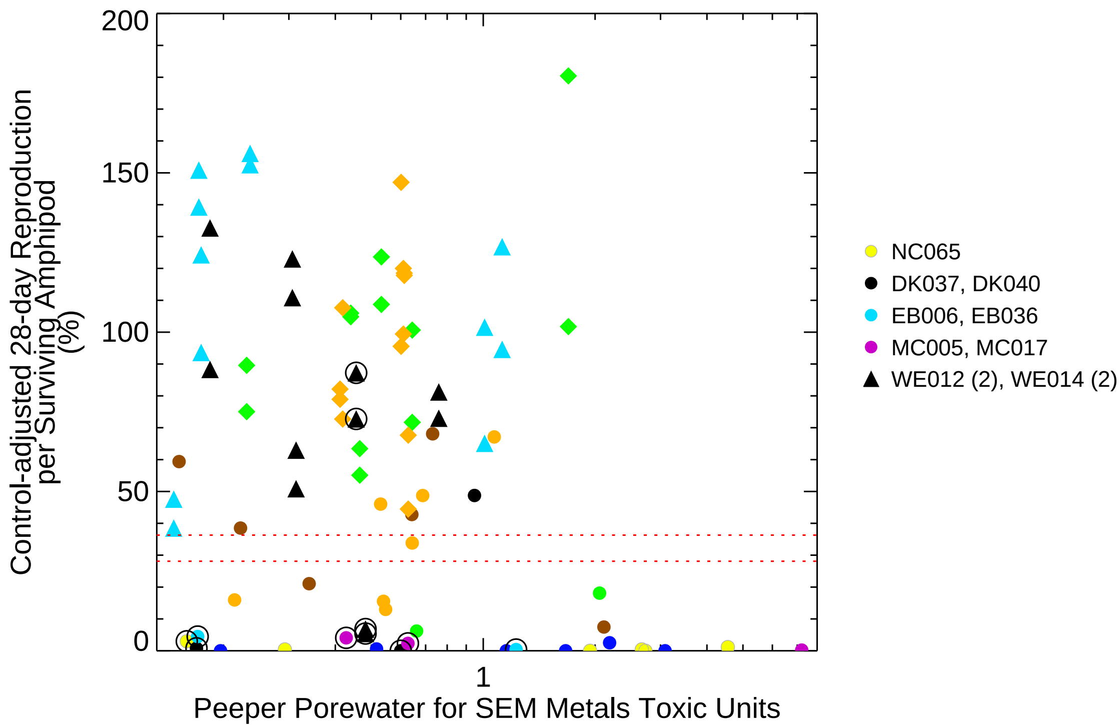
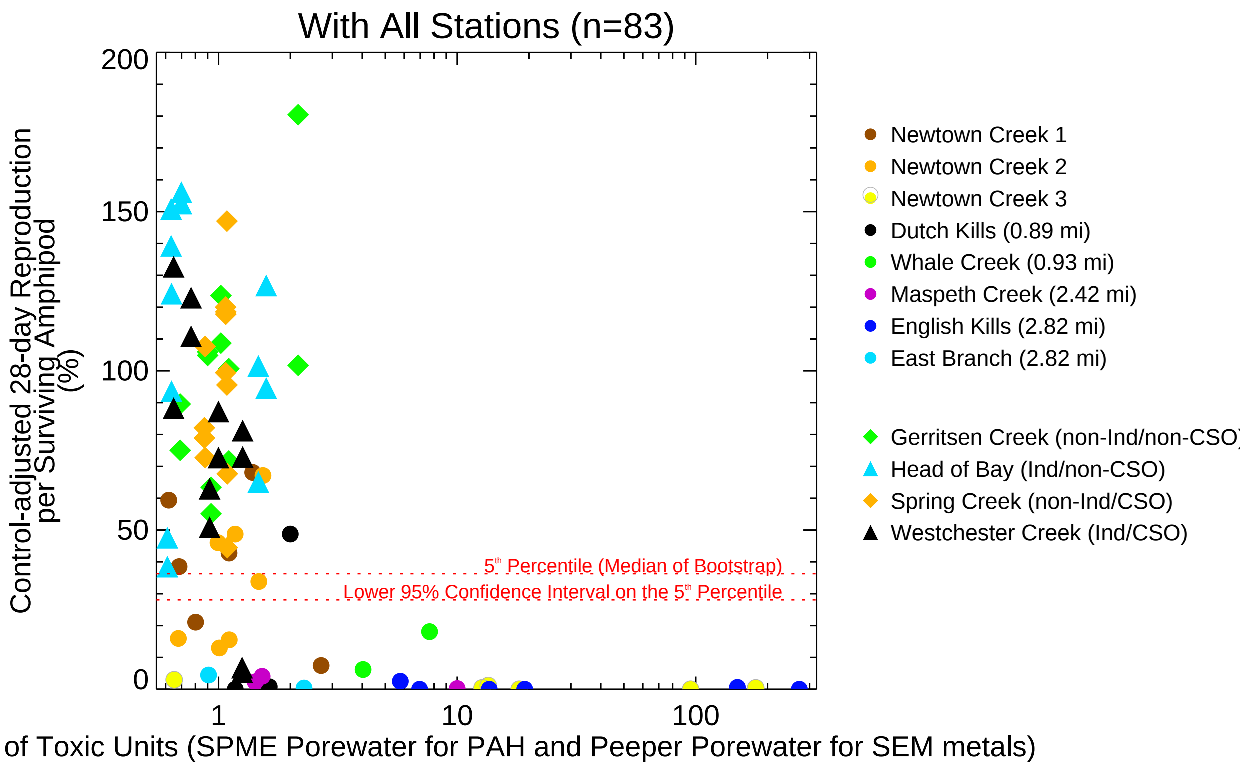


Figure 8-22a

Leptocheirus Concentration-Response - Control-adjusted 28-day Reproduction per Surviving Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_ReproAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv



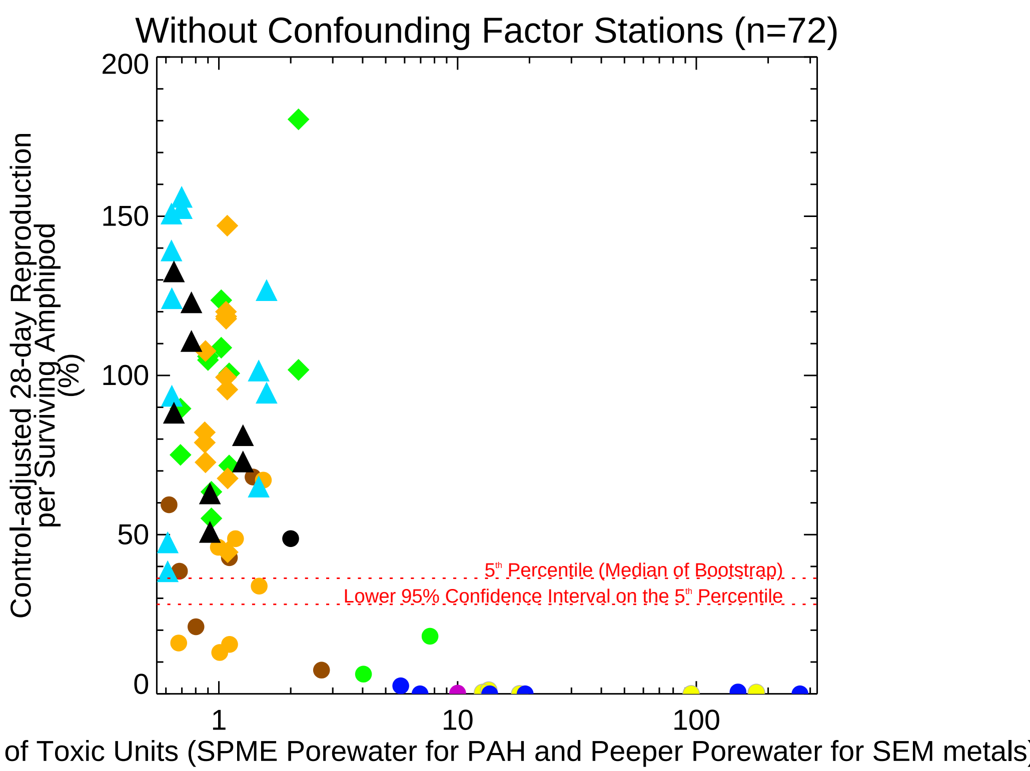


Figure 8-22b

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Reproduction per Surviving Amphipod

Baseline Ecological Risk Assessment

Newtown Creek RI/FS

ANCHOR QEA

Note: Values shown were extracted from JMP regression calculation. Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_ReproAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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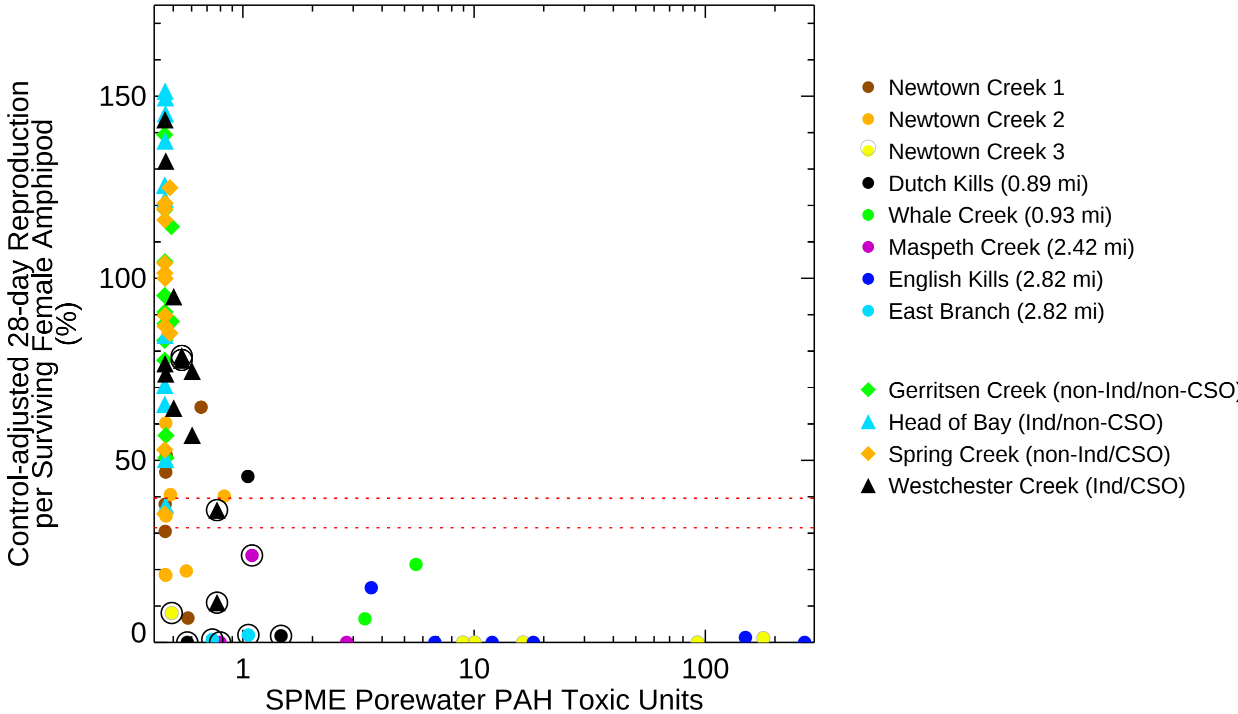

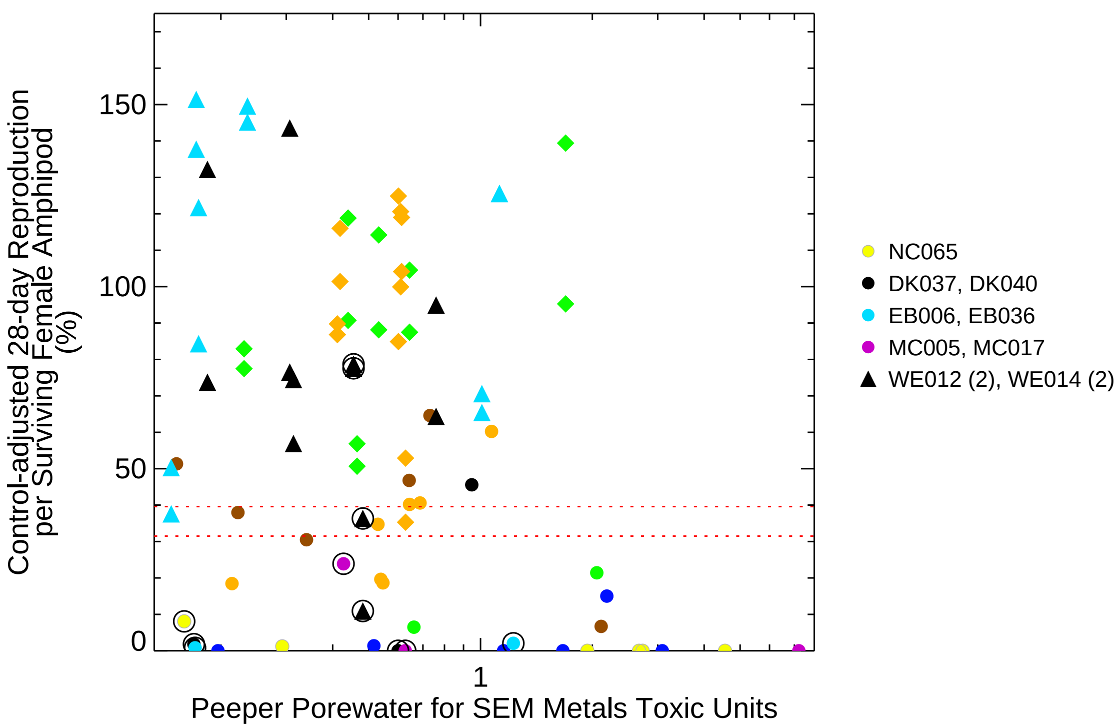

Figure 8-23a

Leptocheirus Concentration-Response - Control-adjusted 28-day Reproduction per Surviving Female Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 28-d_ReproFemaleAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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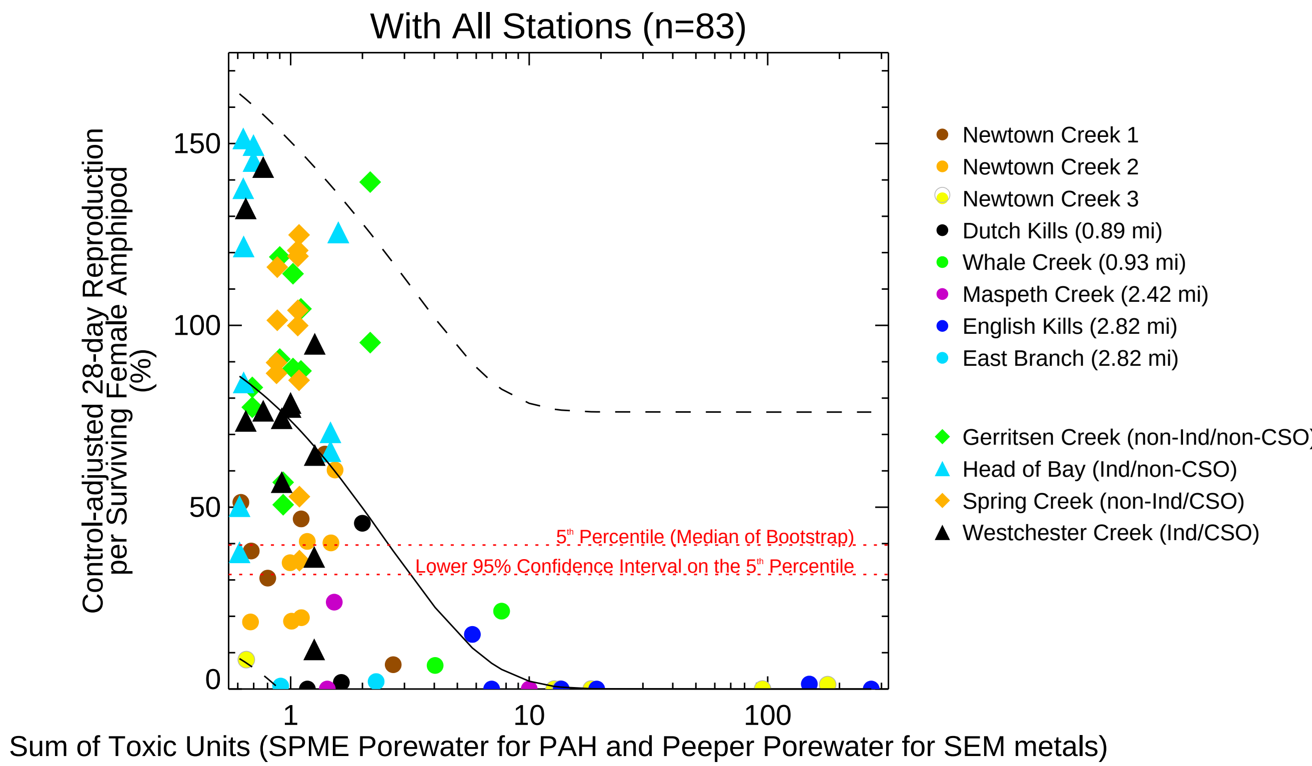

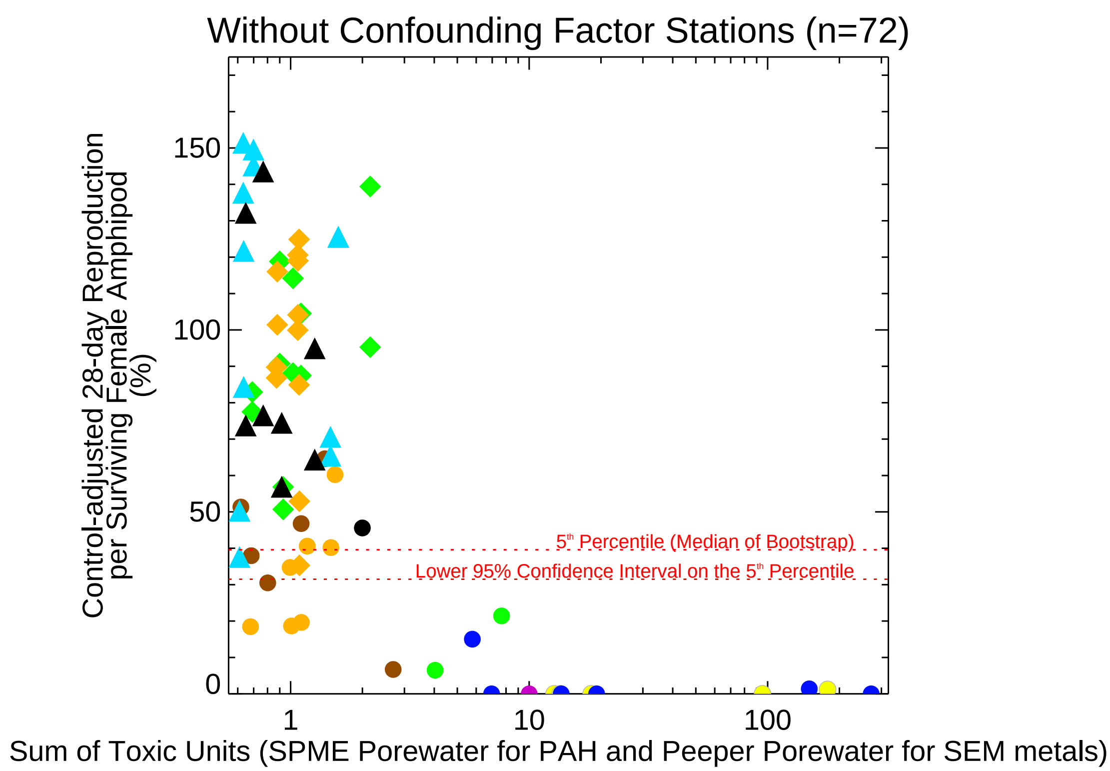

Figure 8-23b

Leptocheirus Concentration-Response Curves - Control-adjusted 28-day Reproduction per Surviving Female Amphipod
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

ANCHOR QEA

Note: Values shown were extracted from JMP regression calculation. Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 28-d_ReproFemaleAmph_Bioassay_PW_PAH_SEM-Metal_noNC013.csv

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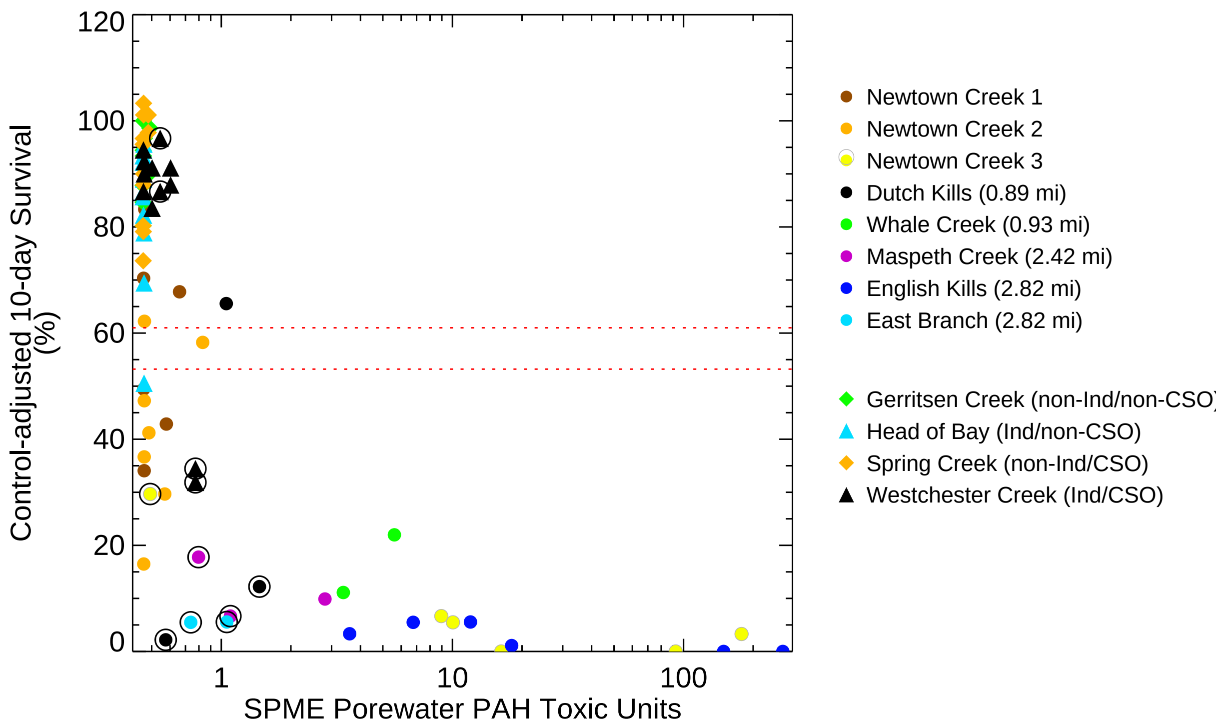


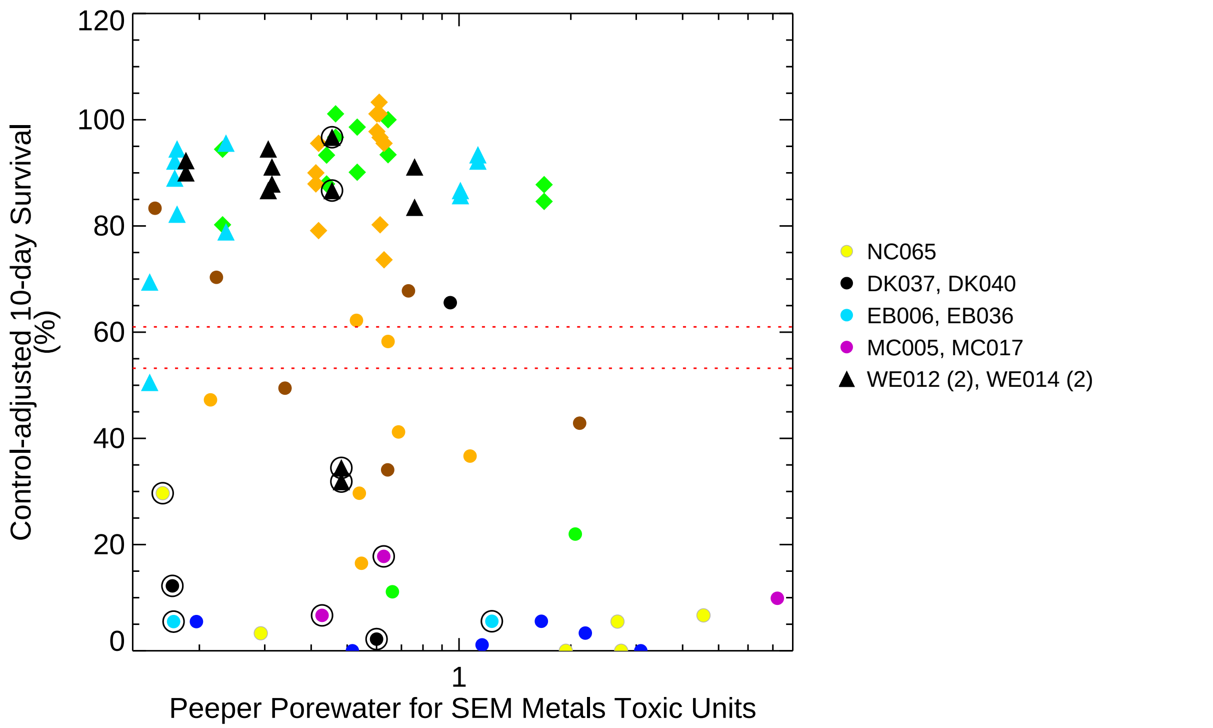
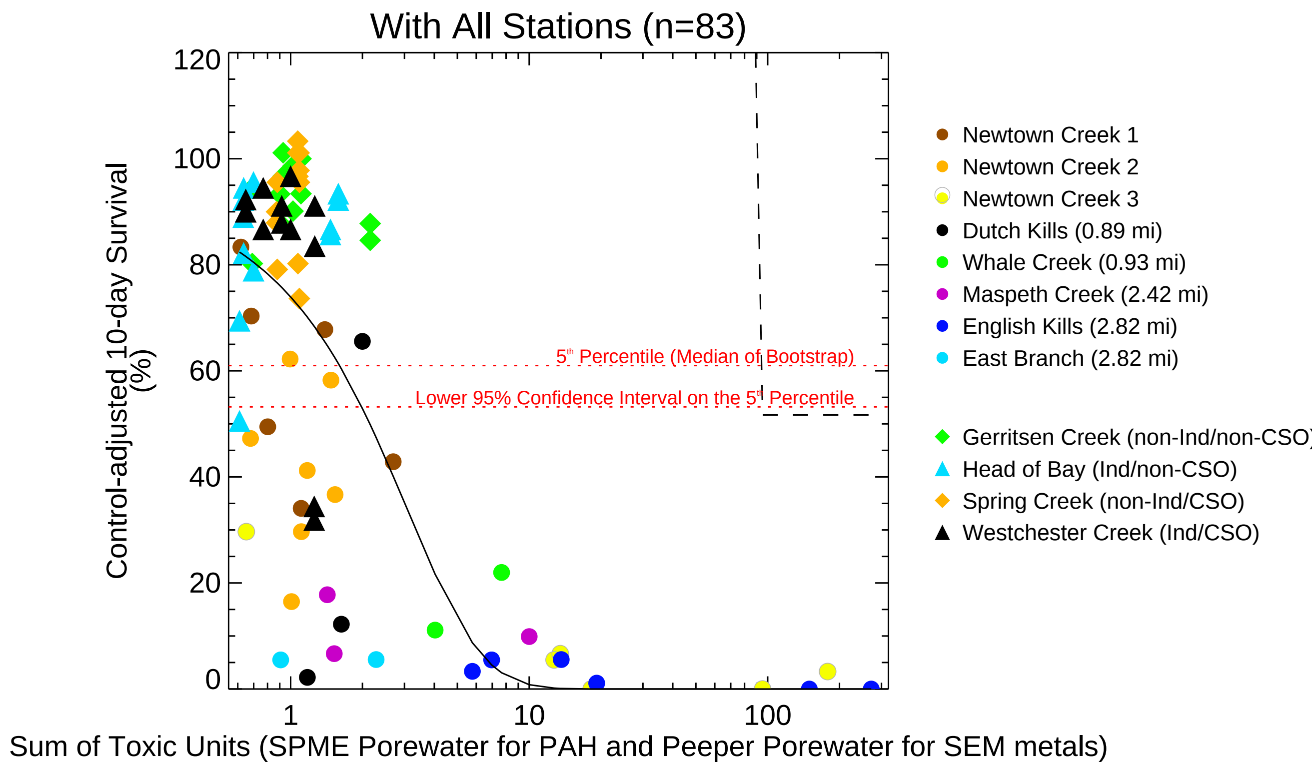


Figure 8-24a

Leptocheirus Concentration-Response - Control-adjusted 10-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Dotted red lines show lower 95% confidence interval on the 5th percentile and 5th percentile (median of Bootstrap).
Data file: 10-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv



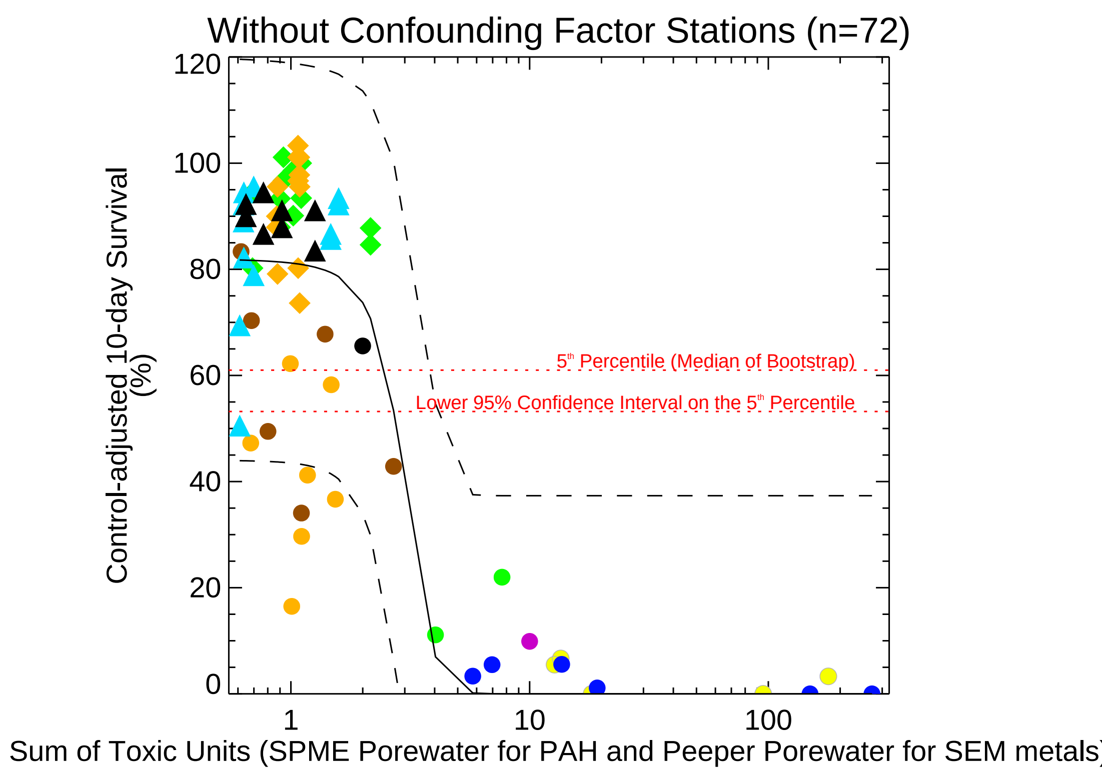


Figure 8-24b

Leptocheirus Concentration-Response Curves - Control-adjusted 10-day Survival
Baseline Ecological Risk Assessment
Newtown Creek RI/FS

Note: Values shown were extracted from JMP regression calculation.
Solid line shows fitted logistic regression output.
Dashed lines show upper and lower confidence intervals where possible to calculate.
Data file: 10-d_Survival Bioassay_PW_PAH_SEM-Metal_noNC013.csv

sms - \\bellingham2\bell2\Projects\Newtown_Creek\RI-FS\Risk_assessment\Triads\Bioassay\IDL\dose_response_regression_curves.pro Tue Jan 19 16:35:54 2016

BERA Response to Comment Items Discussed with USEPA on 1/4/2017

Two items were discussed with USEPA during a dispute resolution call on 1/4/2017:

- Polychaete/sediment regressions
- Surface water screening levels

Polychaete/Sediment Regressions (Response to Comment Matrix ID Nos. 186 and 269)

USEPA commented that it is unacceptable to use predicted tissue concentrations if measured tissue concentrations are available. Anchor QEA clarified that for the wildlife risk assessment, measured polychaete tissue concentrations were used to estimate dietary uptake. Specifically, for the BERA, paired polychaete tissue and bulk sediment concentrations were measured at 13 stations in the Study Area (see BERA Figure 4-4 for the location of the 13 stations). The measured tissue concentrations at these 13 locations were used to estimate dietary uptake at these locations. The paired polychaete-sediment data at these 13 locations also were used to develop a site-specific regression that was then used to predict tissue concentrations at other sediment locations where wildlife dietary uptake was estimated for the BERA but for which polychaete tissue data were unavailable (see BERA report Section 11.4.3.3 and Figures 11-5a to 11-5c).

Surface Water Screening Levels (Response to Comment Matrix ID No. 216)

In accepting the NCG's response to USEPA's original comment, USEPA added the caveat that two additional NYSDEC screening levels (SLs) should be included in the surface water SLERA: one for total DDx and one for the sum of aldrin and dieldrin. Anchor QEA explained that this requirement is confusing because of the timing of the request at this late stage of the BERA, given that the surface water SLs are based on a hierarchy provided to the NCG by USEPA at the beginning of the ecological risk assessment process. In addition, and more importantly, the DDx SL is based on exposure to wildlife, which is being addressed through separate SLERA and baseline analyses, and the aldrin-dieldrin SL is a human health SL based on fish consumption, and therefore, not relevant to an ecological risk assessment.

NYSDEC (Ian Beilby) agreed that since this comment came from them, they would provide a response to the NCG on this item. To date, no response has been received from NYSDEC.

February 8, 2017: ***Newtown Creek Baseline Ecological Risk Assessment: Tissue Screening Levels.*** **Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.**

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www.anchorqea.com

MEMORANDUM

To:	U.S. Environmental Protection Agency	**Date:**	February 8, 2017
From:	Newtown Creek Group	**Project:**	171037-01.01
Re:	Newtown Creek Baseline Ecological Risk Assessment: Tissue Screening Levels		

This memorandum responds to the U.S. Environmental Protection Agency's (USEPA's) e-mail of February 3, 2017, titled "TRV Memo Comments," specifically with regard to USEPA's comments on the tissue screening levels (SLs; Items 8, 10, and 11 of the e-mail). USEPA states that there is not enough information in the January 20, 2017 memorandum (NCG 2017) from the Newtown Creek Group (NCG) to determine how the listed SLs were derived.

As discussed in the Newtown Creek draft *Baseline Ecological Risk Assessment* (BERA; Anchor QEA 2016), and the January 20, 2017 memorandum, the U.S. Army Corps of Engineers Environmental Residue-Effects Database (ERED; USACE 2013) and PCB Residue Effects database (PCBRes; USEPA 2007) are the primary sources for the no observed effect concentrations (NOECs) used to derive the SLs presented in the BERA.

Therefore, this memorandum provides a series of tables with the NOECs from ERED and PCBRes that includes for each study the authors, the publication, the test species, the life stage, and the endpoints evaluated as downloaded from the databases, as well as NCG's calculation of the geometric mean for each endpoint. These are the geometric mean values presented in the BERA Table 5-3a for fish and Table 5-3b for invertebrates.

As noted by USEPA in their February 3, 2017 e-mail, because there is a wide range in the NOECs from the studies, the NCG used an average value and preferentially selected the geometric mean because it was always lower than the arithmetic mean. Furthermore, the NCG then selected the minimum of the geometric means regardless of the endpoint (reproduction, growth, or mortality) as an SL in the BERA.

As a reminder, when reviewing the data in the databases, the following criteria were applied:

- Only NOECs for reproduction, growth, and mortality were used (lowest observed effect concentrations [LOECs] were retained for reference).
- Only results presented as concentrations for whole body burdens were used.
- All life stages for each species were used.
- No duplicate results were presented.
- If the ERED notes stated there was a secondary exposure to a parasite or another chemical, the data were not used.
- For each endpoint (reproduction, growth, and mortality), a geometric mean NOEC was calculated, and the minimum of the three endpoints for a particular chemical was selected as the SL NOEC.

References

Anchor QEA (Anchor QEA, LLC), 2016. *Baseline Ecological Risk Assessment*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. February 2016.

NCG (Newtown Creek Group), 2017. *Newtown Creek Baseline Ecological Risk Assessment: Selection of Wildlife Toxicity Reference Values and Tissue Effect Thresholds*. Memorandum to U.S. Environmental Protection Agency. January 20, 2017.

USACE (U.S. Army Corps of Engineers), 2013. Environmental Residue-Effects Database (ERED). Accessed August 2013. Available from: http://el.erdc.usace.army.mil/ered/.

USEPA (U.S. Environmental Protection Agency), 2007. PCB Residue Effects (PCBRes) User Guide. Version 1.0. Prepared for USEPA Office of Research and Development, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division (MED). Prepared by Computer Sciences Corporation. Contract 68 W-02 032, Task 5003 and 5004. October 2007. Accessed August 2013. Available from: http://www.epa.gov/med/Prods_Pubs/pcbres.htm.

February 21, 2017: EPA email reply (Subject: Re: BERA Dispute Status) to AQ’s question regarding how to censor Reference Area data.

From: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>
Sent: Tuesday, February 21, 2017 7:25 AM
To: Jim Quadrini; Kwan, Caroline; Schmidt, Mark; Nace, Charles; Leonard, Edward L.; Cooke, Daniel W.; Ian Beilby; Chitra Prabhu (cprabhu@louisberger.com); Weissbard, Ron
Cc: Tom Schadt; Stuart Messur; David Haury; Linda Logan
Subject: Re: BERA Dispute Status

Hi Jim,

Below is EPA's reference area data response. It was inadvertently left off the 2/17 email.

Let's still have the 2:00 call today, even if it's just to touch base and assure we are all on the same page. We may not need the full 2 hours for this call. If necessary, we can then schedule the final wrap-up call later in the week, as you suggest.

Thanks,
Stephanie

Below is additional information related to EPA's Reference Area censoring methodology to determine whether any Reference Area sample locations are outliers. The NCG comments are paraphrased questions that were asked during our 2/13/17 call.

1) **NCG comment:** PCB Aroclor data was used in the Phase 1 ranking selection PEC-Q calculations. Phase 2 sediment analysis was done for PCB congeners. NCG would like to adjust the PCBs congener data to Aroclor data for calculating the PEC-Q for Phase 2 data.

   EPA response: For the outlier analysis, EPA requires that NCG use the congener data, rather than using a conversion factor to go from congener to Aroclor equivalent. Because the Reference Area selection process will use the mean PEC-Q, the result (i.e., which sample locations are outliers) will likely not be significantly different using either the congener or Aroclor equivalent method, but it is always preferable to use measured data rather than estimated data.

2) **NCG comment:** NCG would like EPA to clarify how to calculate the mean PEC-Q using the chemicals identified in the footnote in our censoring direction. Specifically, if NCG should use the process that was used during the Phase 1 ranking or if NCG should use the NOAA process.

   EPA response: Since the Reference Areas were selected using the NCG mean PEC-Q using PAH-17 calculation, the NCG mean PEC-Q using PAH-17 calculation should be used for censoring the data set.

3) **NCG comment:** NCG indicated that an average mean PEC-Q was used in the ranking process and NCG suggests that an average value for the Reference Areas should also be used to censor the data set instead of comparing individual stations to the criterion of 0.55.

   EPA response: The purpose of the initial ranking process was to select waterbodies from a candidate list. Thus, an average for the waterbodies was used. The process of censoring data is to remove outliers from the data set. Thus, comparing individual stations to the criterion is applicable. The mean PEC-Q using PAH-17, following NCG's Phase 1 method, should be calculated for each sample location and compared to the criterion of PEC-Q = 0.55. Sample locations that exceed the value of 0.55 should not be included in the data set used for the reference envelope evaluation.

4) **NCG comment:** EPA provided details on how to compare Newtown Creek SQT data to the SQT data collected from the individual Reference Areas. NCG requested clarification on how to address the toxicity and benthic community data.

   EPA response: The reference envelop will be used to evaluate Newtown Creek to the combined reference areas, with outliers removed. The evaluation of Newtown Creek data to each of the individual reference areas should compare and contrast summary statistics for the chemical results and all other endpoints measured for toxicity and benthic community. The individual comparisons would be performed using the same approach as the reference envelop, and will include a discussion of how the four source categories (industrial/non-industrial and CSO/limited CSO) correlate with the results. There should be at least four subsections: Newtown Creek and Westchester Creek; Newtown Creek and Gerritsen Creek; Newtown Creek and Head of Bay; Newtown Creek and Spring Creek. Additional subsections, if warranted based on the data, that group industrial locations (Westchester Creek and Head of Bay) and non-industrial (Spring Creek and Gerristen Creek) may also be included.

5) **NCG comment:** Should NCG use only SQT data locations in the evaluation of Reference Areas?

   EPA response: It was noted that the spreadsheet that EPA provided to NCG as an example contained several stations that did not have SQT data. As noted on the call, the spreadsheet was an example, and EPA agrees that only the sample locations with full SQT data sets would be used in the reference envelope and individual reference area comparison.

From: Jim Quadrini <jquadrini@anchorqea.com>
Sent: Monday, February 20, 2017 3:35 PM
To: Vaughn, Stephanie; Kwan, Caroline; Schmidt, Mark; Nace, Charles; Ed Leonard (leonardel@cdmsmith.com); Cooke, Daniel W.; Ian Beilby (ian.beilby@dec.ny.gov); Chitra Prabhu (cprabhu@louisberger.com); Weissbard, Ron
Cc: Tom Schadt; Stuart Messur; David Haury; Linda Logan
Subject: RE: BERA Dispute Status

Stephanie,

The NCG requests that the BERA dispute "wrap-up" call currently scheduled for Tuesday, February 21st at 2 pm ET be postponed until later in the week for the following reasons:

- We did not receive your email below until approximately 5 pm on Friday, leaving no time to review the material with the NCG in advance of tomorrow's call, particularly since today is also a holiday for some NCG members
- The NCG also has not yet received EPA's re-analyses on the reference area data censoring methodology; since this is an important component of the ongoing discussions with EPA, it does not make sense to have a wrap-up call until this information is sent to the NCG and the NCG has had time to review the information

The timing of the wrap-up call should be based on when we receive the reference area re-analyses from EPA and have had adequate time to review that information in addition to the information you sent on Friday. Thank you for considering this request.

Jim

From: Vaughn, Stephanie [mailto:Vaughn.Stephanie@epa.gov]
Sent: Friday, February 17, 2017 4:47 PM
To: Jim Quadrini <jquadrini@anchorqea.com>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>; Ed Leonard (leonardel@cdmsmith.com) <leonardel@cdmsmith.com>; Cooke, Daniel W. <cookedw@cdmsmith.com>; Ian Beilby (ian.beilby@dec.ny.gov) <ian.beilby@dec.ny.gov>; Chitra Prabhu (cprabhu@louisberger.com) <cprabhu@louisberger.com>; Weissbard, Ron <RWeissbard@dep.nyc.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Stuart Messur <smessur@anchorqea.com>; David Haury <dhaury@anchorqea.com>; Linda Logan <llogan@anchorqea.com>
Subject: RE: BERA Dispute Status

Hi Jim,
Below is additional information related to some of the BERA dispute items that the NCG still considers under discussion, as noted in your 2/15/2017 email. The comments address technical memos you forwarded on 2/2/17 (Benthic Invertebrate Risk Assessment Summary) and on 2/8/17 (Tissue Screening Levels). We can discuss this information during our 2/21/2017 dispute wrap-up call.
Thank you,
Stephanie

<u>Issue 1: Tissue Screening Levels</u>
The Draft Baseline Ecological Risk Assessment written by Anchor QEA for the Newtown Creek site was submitted to EPA in February 2016. EPA reviewed the document, and issued comments on 6/11/16. The NCG responded to the comments on 11/4/16, and EPA replied to NCG on December 6, 2016. The NCG then submitted a Notice of Dispute Resolution regarding the BERA on 12/22/16. A Dispute Resolution meeting was held on 1/11/17, and among the technical issues that could potentially be resolved through additional information was a request from EPA for more information and explanation on the derivation of toxicity reference values (TRVs) used in the Draft BERA. Anchor QEA submitted a memorandum, "Newtown Creek Baseline Ecological Risk Assessment: Selection of Wildlife Toxicity and Reference Values and Tissue Effect Thresholds" on 1/20/17. A second Dispute Resolution meeting was held in New York City on 1/26/17, prior to which the TRV memo had only been partially reviewed. EPA provided comments to the 1/20/17 memorandum, requesting additional information on the derivation of benthic invertebrate and fish tissue screening levels. Below are EPA's comments on the Tissue Screening Levels memo:

1. General Comment: The Screening Level memo was well written, and clearly detailed the derivation of the invertebrate and fish tissue screening levels utilized in the BERA. Such clarity makes the BERA much easier to review. For the most part, the screening levels were derived and utilized in an acceptable manner.
2. The fish tissue screening levels for Total PCBs were based only on Aroclor 1254, and were significantly higher than the tissue levels EPA has accepted at other sites. To be consistent with EPA's requirements for similar sediment sites, EPA requires the use of fish tissue whole body residue values that have already been established for a number of COPECs for the nearby Passaic River site. The Record of Decision (ROD) for the Lower 8.3 Miles of the Lower Passaic River was published March 3, 2016. The acceptable values were listed in the *Lower Eight Miles of the Lower Passaic River Focused Feasibility Study Report* (FFS; The Louis Berger Group, 2014). The FFS lists fish tissue critical body residue thresholds as both NOAEL and LOAEL in Table 4-13:

COPEC	NOAEL (ug/g wet wt)	LOAEL (ug/g wet wt)
Copper	0.32	1.5
Lead	0.4	4.0
Mercury	0.052	0.26
LMW PAHs	0.26	2.6
HMW PAHs	0.21	2.1
Total PCBs	0.17	0.53
Dieldrin	0.008	0.04
Total DDx	0.078	0.39
2,3,7,8-TCDD	8.9E-07	1.8E-06

3. The invertebrate tissue screening levels were based on the USACE ERED, as described. However, to be consistent with EPA's requirements for similar sediment sites, EPA requires the use of invertebrate tissue whole body residue values that have already been established for a number of COPECs for the nearby Passaic River site. The acceptable values were listed in the FFS (The Louis Berger Group, 2014). The FFS lists macroinvertebrate tissue critical body residue thresholds as both NOAEL and LOAEL in Table 4-13:

COPEC	NOAEL (ug/g wet wt)	LOAEL (ug/g wet wt)
Copper	5	12
Lead	0.52	2.6
Mercury	0.048	0.095
LMW PAHs	0.078	0.78
HMW PAHs	0.022	0.22
Total PCBs	0.008	0.026
Dieldrin	0.0016	0.008
Total DDx	0.06	0.13
2,3,7,8-TCDD	1.5E-07	1.3E-06

4. The fish and macroinvertebrate tissue screening values for other COPECs were calculated as described by NCG, and appear to be acceptable.

Issue 2: Benthic Macroinvertebrates and Confounding Factors

EPA appreciates the additional supporting documentation to help explain the evaluation conducted for the benthic macroinvertebrate risk assessment. EPA has provided comments on the supplemental material, with references to original EPA comments that need to be addressed. Assuming that the comments are adequately addressed, and that the nine sample locations suggested to be associated with the confounding factors are further clarified as: 1) being toxic; and 2) include a robust discussion about other possible reasons for the toxicity (including but not limited to, bulk sediment comparisons, concentrations of individual compounds and DNAPL), the discussion and figures that were identified as needing to be deleted can remain in the document. It would be helpful for the revised section to be submitted to EPA prior to submission of the entire Revised BERA to ensure that it meets the Agency's expectations.

The 1/11/17 dispute meeting yielded that another technical issue that could potentially be resolved through additional information was a request from EPA for more information and explanation on confounding factors and benthic macroinvertebrate toxicity test results described in the Draft BERA. Anchor QEA submitted a memorandum, "Newtown Creek Baseline Ecological Risk Assessment Benthic Macroinvertebrate Risk Assessment Summary" on 2/2/17. Below are EPA's comments on the memo:

1. 1st page, Part 1, Overall Approach, 3rd sentence: "The use of AVS and SEM and porewater chemistry to evaluate bioavailability rather than rely on bulk sediment chemistry is consistent with the state-of-the-science to assess risks tot benthic organisms." While AVS/SEM is a valuable line of evidence, the inherent variability of the method means it is not as definitive as inferred by NCG. EPA's comments on the BERA (comment ID No. 9, 16, 91, 97, 138) stated that bulk chemistry was also a necessary line of evidence.

The EPA method (2005) allows a variety of extraction methods (gravimetry, colorimetry, gas chromatographic photoionization, and ion-specific electrochemistry). Variability may also be introduced through sample heterogeneity, and through oxidation of reduced sulfur species between the times of collection and analysis.

Hammerschmidt and Burton (2010) found that measured concentrations of both AVS and SEM were highly variable. They sent four different sediment samples to each of seven different independent labs, and found that measured AVS in the four samples varied between laboratories by factors of 70 to 3,500-fold. Measurement of SEM in the four samples varied between labs by factors of 17 to 60-fold. As a result, the calculation of AVS/SEM ratios is highly uncertain.

A follow-up interlaboratory comparison was conducted by Brumbaugh *et al.* (2011) where AVS and SEM nickel concentrations were measured by five labs that were aware of the interlaboratory comparison and were provided specific guidance for conducting sample preparation, analysis, and QC measurements (to eliminate the multiple methods). The study showed that AVS/SEM can be reproducible when the methods have been standardized to allow consistent performance. However, even if performed by a single lab, using the same method every time, these two studies indicate that the research behind the AVS/SEM toxicity method needs to be reevaluated to be method-specific.

Overall, while AVS/SEM is a potentially useful tool for assessing bioavailability and associated toxicity of sediment metals, it should not be used as a stand-alone line of evidence for evaluating risk until laboratory methods have been standardized enough to allow consistent inter-laboratory reproducibility (NJDEP, 2015). Bulk chemistry is an important line of evidence, and should not be discounted as simply a screening method in favor of AVS/SEM (as was done by NCG), particularly when the AVS/SEM results do not show strong correlation with observed toxicity.

2. 2nd page, 1st incomplete paragraph: The document states that the benthic community responds most strongly to dissolved oxygen in the water column than on the SQT. This has not been satisfactorily demonstrated in the Draft BERA. EPA's comment ID No. 112 states that the text and figures presented in the BERA do not support that conclusion. NCG responded that the text and figures would be revised to clarify the line of evidence, but as yet, EPA has not seen the revisions and does not agree that the benthic community responds more strongly to water column DO than to SQT (including bulk sediment chemistry).
3. 3rd page, Toxicity Section, 2nd paragraph, 3rd sentence: "The results of the toxicity tests and porewater chemistry were combined to develop porewater-based concentration-response relationships for those

COPECs with porewater TUs greater than 1 (see Figures 8-19a through 8-24a)." The figures show a relationship only when 11 sample locations (13% of the total number of locations) are removed from the assessment.

4. 4th page, Numbers 1 and 2 at the top of the page: The two numbered statements say that all but nine of the 28-day toxicity test sample locations (the two samples from Westchester Creek were run twice to total 11 samples) are consistent with porewater based relationships. The paragraph that follows the numbered statements relates the nine locations (MC005, MC017, NC065, DK037, DK040, EB006, EB036, WE012, and WE014) to CSOs, as displayed on Figure 8-13. However, the relationship is not supported. Figure 8-13 also shows that in Maspeth Creek, location MC023 is closer to the large CSO than locations MC005 and MC017, but MC023 was consistent with the porewater based relationship. In Newtown Creek, there are multiple CSOs near sample locations NC013, NC161, NC162, NC037, and NC165, yet all of those locations were considered to be consistent with the porewater-based relationship. Figure 8-13 shows that there were only two sample locations each in Dutch Kills and East Branch, so there is no comparison to other locations near the CSOs in those reaches. While Westchester Creek is not on the figures attached to this memo, there were multiple CSOs near five of the sample locations in Westchester Creek, and three of those locations were consistent with the porewater based relationship. There is no technical analysis or explanation as to why the nine locations were removed and the others in close proximity to CSOs were not. Removing these nine locations as being CSO-related simply because they weaken the correlation is not a "plausible explanation", and is not technically defensible.

The contingency tables (Table 8-9) only list comparisons for the sum of total SEM metals TU and SPME PAH TU from porewater. This does not allow for consideration of a single risk driver (or several individual drivers), as could potentially be identified through assessment of individual PAH compounds as noted in EPA's Draft BERA comment ID Nos. 15, 16, 132, 137, and 138. More importantly, it ignores the bulk sediment chemistry. The fact that strong correlations could not be made using a limited scope of contaminants/media is not a reason to exclude nine sample locations as CSO-related. Additionally, NCG could assess the individual locations against individual contaminants to derive correlations, and perhaps there are different primary drivers in different reaches of the Newtown Creek system. The current analysis is incomplete.

5. 4th page, 2nd paragraph: Evaluation of which toxicity test is a better predictor of toxicity using the same contingency table method is flawed from two perspectives: 1) the limited contaminant/media used in the contingency; and 2) toxicity testing is a direct measure of toxicity. Because the 10-day toxicity study did not match up to the contingency tables as well as the 28-day toxicity study indicates that the design of the contingency tables is not suitable for the Newtown Creek data.

The 10-day sediment toxicity study is just as valid as the 28-day study, and should be given equal weight in the risk assessment (EPA comment ID No. 11 and 139). The 10-day study is a standard method that has been successfully performed for many years. The 10-day study performed for the Newtown Creek project met all acceptability criteria, all standard reference acceptability criteria, and the lab control and reference area samples were all exposed under the same conditions as the Study Area samples. There is no scientifically defensible reason to exclude the 10-day study.

6. 4th page, numbered bullets at the bottom of the page: Removing sample locations to improve "false positive" rates does not appear to be supported. While it certainly makes the analysis tighter, it requires removing 13% of sample locations to bring the "error" rate to 1%. Stating that the 10-day toxicity results are a poor predictor of the porewater-based concentration-response relationship means only that the porewater-based correlations were insufficient to capture the potential within-site variability, to address the variability of the AVS/SEM method, to address individual contaminants as risk drivers, or to address the toxicity associated with bulk sediment.

7. 5th page, 2nd bullet: sediment bioassay results are partially explained by porewater chemistry, but results will not be fully explained until correlations have been developed for individual contaminants, individual locations, porewater chemistry, and bulk sediment chemistry.
8. 5th page, 3rd bullet: sediment bioassay results are not explained by proximity to CSO and MS4 discharge locations. There are numerous outfalls in the Newtown Creek system, and with the ebb and flow of the tides, there are numerous (at least double the number of stations excluded by NCG) sediment triad samples within proximity to one or more outfall. Additionally, what is currently being called "confounding factors" could be a function of the limited contaminant/media used in the correlation analyses.
9. 5th page, 4th bullet: While confounding factors are a concern, it does not appear that NCG has sufficiently assessed the physical/chemical/toxicological data collected at the triad sediment sample locations.
10. Benthic Flow Chart – Part 2: The first box, titled "Benthic Risk Assessment" only lists porewater-based concentration-based relationships, and it should include individual COPECs (as opposed to just TPAH and SEM metals TU), and bulk sediment. The boxes dealing with the removal of nine stations and the association with CSOs are not supported by the data, the explanation in the Draft BERA, nor the additional explanations in this technical memo. While the observed toxicity could not be explained by the narrow set of analyses performed, there was no attempt to link observed toxicity to CSOs other than by proximity (which does not appear to be supported by the figures attached to the memo).
11. 45th page, Polychaete/Sediment Regressions: This section relates to two of EPA's Draft BERA comments. Regarding comment ID No. 186, the response is acceptable. EPA required that the measured polychaete tissue data be used in wildlife exposure estimates, and NCG states that the measured tissue concentrations were used to develop BSAFs to predict tissue concentrations for areas where tissue data was not collected.

However, Comment ID No. 269 required that BSAFs be developed for each of the Study Area segments, rather than for the Study Area as a whole. The memo states that the BSAF was developed for the entire Study Area. This was unacceptable in the comment matrix, and is still unacceptable. Empirical tissue data should be used to develop BSAFs for each of the Study Area segments, or an additional analysis should be included that supports using a creek-wide BSAF.

12. 45th page, Surface Water Screening Values: This paragraph refers to the NYSDEC comments on the use of surface water criteria for Aldrin/dieldrin and DDx. Ian Beilby provided clarification to NCG in an email dated 2/7/17, which was five days after NCG submitted the memo to EPA. As part of a 2/13/17 conference call between NCG and EPA, NCG requested clarification about how to proceed with NYSDEC's comments. EPA is working on clarification with NYSDEC, and will provide information to NCG during the dispute Negotiation Period.

References

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Hammerschmidt, CR and GA Burton Jr. 2010. Measurements of Acid Volatile Sulfide and Simultaneously Extracted Metals are Irreproducible Among Laboratories. *Environmental Technology and Chemistry*, Volume 29, number 7, pp 1453-1456.

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The Louis Berger Group (in conjunction with: Battelle and HDR/Hydroqual). 2014. Lower Eight Miles of the Lower Passaic River Focused Feasibility Study Report. Submitted to the US EPA Region 2 and the US Army Corps of Engineers, Kansas City District.

From: Jim Quadrini [mailto:jquadrini@anchorqea.com]
Sent: Wednesday, February 15, 2017 11:49 AM
To: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>; Ed Leonard (leonardel@cdmsmith.com) <leonardel@cdmsmith.com>; Cooke, Daniel W. <cookedw@cdmsmith.com>; Ian Beilby (ian.beilby@dec.ny.gov) <ian.beilby@dec.ny.gov>; Chitra Prabhu (cprabhu@louisberger.com) <cprabhu@louisberger.com>; Weissbard, Ron <RWeissbard@dep.nyc.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Stuart Messur <smessur@anchorqea.com>; David Haury <dhaury@anchorqea.com>; Linda Logan <llogan@anchorqea.com>
Subject: BERA Dispute Status

Stephanie,

As requested during the meeting on 2/13, the following presents the NCG's understanding on the status of Newtown Creek BERA items as documented in the 12/22/16 dispute resolution letter. Please forward this to others, as appropriate.

Note this information is subject to change depending on future discussions with EPA and in the event that more information becomes available.

Primary Disputed Items

Schedule
The schedule for submittal of the next draft BERA report is to be determined following completion of the dispute resolution period (currently through 2/23/17)

Reference Areas: Censor stations and Use Individual Reference Areas
EPA is directing that the reference area stations to be censored using a PEC-Q approach as provided to the NCG on 2/3. During the 2/13 meeting, the NCG expressed some concerns over the computation and application of the approach (use of individual metal PEC-Qs rather than an average metal PEC-Q; use of an overall average PEC-Q to evaluate individual stations; inclusion of non-triad stations; a need to re-calculate using updated datasets). EPA will consider NCG's comments and will provide additional information on the PEC-Q approach. EPA will also provide clarification on use of individual reference areas.

Based on the 2/13 discussion, this item is still under discussion.

Sediment Bioassays: Sediment-Porewater Relationship and Confounding Factors
The NCG sent a technical memorandum to EPA on 2/2 clarifying the BERA approach. During the 2/13 meeting, EPA stated they want the risk characterization step to also include a comparison of the bioassay results to bulk sediment concentrations. The NCG is of the strong opinion that the Phase 2 Work Plan decisions, which were reached after careful discussions with, and the approval of, the agency, recognized that porewater was the more relevant medium to evaluate

potential impacts from COPECs. Hence, the Phase 2 program included broad porewater sampling throughout the Study Area.

In addition, EPA stated that a discussion of confounding factors may be appropriate to include in the risk characterization step if the discussion was broadened to include other potential confounding factors in addition to the ones included in the Draft BERA. EPA is finalizing its comments on the 2/2 memorandum and these comments may lead to additional discussions between the parties. The NCG believes a full discussion of confounding factors in the risk characterization is important in light of the strong evidence that toxicity observed at specific stations is not associated with COPECs in porewater.

Based on the 2/13 discussion, the NCG considers this item still under discussion.

10-day Sediment Toxicity Test
This was discussed with EPA during a meeting on 1/11/17. The NCG would like to provide additional comments to EPA before the dispute resolution period ends.

At this time, the NCG considers this item to be under dispute.

<u>Other Items for Dispute</u>

Wildlife Exposure Modifying Factors
During the meeting with EPA on 1/11/17, EPA stated they would like the wildlife baseline risk analyses to include a range of exposure modifying factors (EMFs) in the risk characterization of the report; not confine these analyses to just the uncertainty section. The NCG had responded to EPA's original comments by agreeing to use a range of EMFs in the uncertainty section of the report.

At this time, the NCG considers this item to be under dispute.

Selection of Fish and Wildlife TRVs
The NCG sent a technical memorandum to EPA on 1/20 with additional information on selection of the wildlife and fish TRVs. EPA approved use of the wildlife TRVs in a 2/3 e-mail to the NCG, but requested more information on the tissue TRVs. Additional information on the tissue TRVs was sent to EPA on 2/8. During the 2/13 meeting, EPA indicated this information is still under review.

The NCG considers selection of the wildlife TRVs resolved; tissue TRVs are still under discussion.

White Perch
Use of white perch fillet data in the BERA risk analyses was discussed with EPA on 1/11. In a 1/20 follow-up email, EPA stated that white perch should be treated qualitatively in the BERA through comparison with striped bass fillet data. This was confirmed in a 1/26 meeting with EPA.

The NCG considers this issue resolved.

<u>Additional Responses to be Discussed with EPA</u>

Polychaete- Sediment Regressions
During a meeting with EPA on January 4, the NCG clarified use of the polychaete-sediment regressions in the BERA. The NCG provided this clarification in writing to EPA on 2/2. The NCG wants to determine whether EPA needs further clarification.

At this time, the NCG considers this issue to still be under discussion.

NYSDEC WQS

The use of additional NYSDEC surface water standards was discussed during the 1/11 meeting with EPA. In a follow-up e-mail on 2/7, NYSDEC indicated that NYSDEC water quality standards for the protection of wildlife and for human health based on fish consumption should be considered in the porewater evaluation of the BERA. During the 2/13 meeting, EPA agreed to discuss this further with NYSDEC.

At this time, the NCG is waiting for EPA to clarify NYSDEC comments.

Jim

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March 7, 2017: ***BERA Dispute Resolution: Status Summary – March 7, 2017*****, Prepared by Anchor QEA on behalf of the Newtown Creek Group, and submitted to EPA Region 2.**

From: David Haury <dhaury@anchorqea.com>
Sent: Thursday, March 09, 2017 4:52 PM
To: Vaughn, Stephanie; Sivak, Michael; Kwan, Caroline; Schmidt, Mark; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA); Ian Beilby; Mintzer, Michael; Nace, Charles
Cc: Tom Schadt; Jim Quadrini; David Bridgers; Linda Logan
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment
Attachments: BERA_Dispute_Status_Summary_USEPA_Draft_ 2017-03-09.pdf

Stephanie – Please see the attached for the NCG's summary of the current status of the BERA dispute. We will be prepared to summarize our positions on March 14th , and address any questions and comments that arise during the meeting. We have also posted the summary to the USEPA and NYC SharePoint sites. Let me know if you have any questions on the summary. Thank you and see you next week in New York.

USEPA: BERA Dispute Resolution: Status Summary – March 7, 2017
NYC: BERA Dispute Resolution: Status Summary – March 7, 2017

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From: Vaughn, Stephanie [mailto:Vaughn.Stephanie@epa.gov]
Sent: Wednesday, March 08, 2017 2:42 PM
To: David Haury <dhaury@anchorqea.com>; Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; ian.beilby@dec.ny.gov; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David Bridgers <David.bridgers@wallerlaw.com>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Hi David,

Thank you for your time yesterday.

As we discussed, the NCG will be providing a revised dispute letter which (1) briefly outlines the items still under dispute and (2) proposes language to resolve the items that are, or potentially are, resolved.

In order for EPA to be fully prepared for the in-person meeting at V&E on March 14th, we request that you submit this letter no later than noon on Friday, but preferably earlier.

Please let us know if you have any concerns.

Thanks,
Stephanie

From: David Haury [mailto:dhaury@anchorqea.com]
Sent: Thursday, March 02, 2017 11:54 AM
To: Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; rayhan.mehran@noaa.gov; ian.beilby@dec.ny.gov; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David Bridgers <David.bridgers@wallerlaw.com>
Subject: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Michael and Stephanie – I am writing in reply to the email sent by Michael to Tom Schadt and David Bridgers on February 23, 2017 clarifying the schedule for the Newtown Creek BERA dispute process (see below for the text of the email). The NCG would like to schedule a call on March 7, 2017 from 3pm to 4 pm ET to continue our technical discussions, if that day and time works for the EPA folks who are participating in the technical discussions. During that call, the NCG will discuss some of the responses provided by EPA to the NCG via email on February 17 and 20, 2017. In addition, our reading of Michael's email is that EPA would like to end the technical discussions in time for Michael to provide his final decision on the items under dispute by March 21, 2017. To that end, the NCG would like to schedule an in-person "wrap-up" meeting with EPA in the morning of March 14, 2017, assuming that Michael Sivak, and other EPA attendees are available that day. Let me know if you are available on these days and times. Thanks.

EPA is writing in connection with the dispute by the Newtown Creek Group of respondents (NCG Respondents), disputing the requirements of EPA's e-mail of December 8, 2016 which directed that Anchor, on behalf of the respondents, provide to EPA by January 23, 2017, a modified Draft Baseline Ecological Risk Assessment ("BERA") responsive in full to EPA comments transmitted by the December 8 email. This dispute was invoked by letter dated December 22, 2016 (sent to EPA by email on December 22) on behalf of the NCG respondents, pursuant to the "Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study" (AOC) at the Newtown Creek Superfund site.

By email dated January 20, 2017, EPA extended the Negotiation Period for the dispute until close of business on February 23, 2017.

Please be advised that pursuant to Paragraph 65 of the AOC, EPA has further extended the Negotiation Period for the dispute until close of business on Tuesday, March 21, 2017.

By selecting this date, EPA acknowledges ongoing technical conversations between EPA and AQ, and allows for the next technical conversation to be scheduled on or about March 7, 2017, which is two weeks after EPA's most recent submittal of information to AQ as part of these ongoing technical conversations. This date also allows for an additional call to discuss issues remaining with regard to the dispute, to be scheduled by March 14, 2017.

The dispute will also address the date required for the submittal by respondents of an approvable BERA responsive to all EPA comments. Thus, in accordance with Paragraph 66 of the AOC, respondents will be required to submit the BERA on the date determined by agreement reached during the Negotiation Period for the dispute, or failing such agreement, on the date determined in accordance with EPA's decision on the dispute.

Michael Sivak
Chief, Passaic, Hackensack and Newark Bay Remediation Branch
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BERA DISPUTE RESOLUTION: STATUS SUMMARY – MARCH 7, 2017

Reference Areas – Still Under Dispute

- Use of Phase 2 reference area data in the calculation of the reference envelope:
  - The NCG continues to dispute USEPA's recommendation to evaluate the suitability of Phase 2 reference area data through the use of the mean PEC-Q metric.
  - However, USEPA has agreed to the inclusion of an analysis of the Study Area bioassay results using a reference envelope comprising the full Phase 2 reference area dataset in the risk characterization section of the BERA, even if the NCG is also required to evaluate the suitability of the Phase 2 reference area dataset using the mean PEC-Q metric.
  - While the NCG still disputes the use of an average mean PEC-Q threshold based on Phase 1 bulk sediment chemistry data from Westchester Creek as an acceptability threshold (i.e., 0.526 rounded up to 0.55) to censor reference area stations, the average mean PEC-Q calculated for Westchester Creek will be calculated using the NCG TPAH (17) method.
  - While the NCG still disputes the use of an average mean PEC-Q threshold based on Phase 1 bulk sediment chemistry from Westchester Creek as an acceptability threshold, the NCG believes the average mean PEC-Q should be re-calculated using adjusted Phase 1 Aroclor data. The NCG was directed by USEPA to adjust the Phase 1 Aroclor data by a factor of 1.75 to represent total PCB congener concentrations.
- Individual reference areas:
  - The revised BERA will include a comparison of the Study Area data to each of the individual reference areas.
  - This evaluation will compare summary statistics for the chemical results and all other endpoints measured for toxicity and benthic community.
  - The individual comparisons will include a discussion of how the four source categories (industrial/non-industrial and CSO/limited CSO) correlate with the results.

Benthic Macroinvertebrates and Confounding Factors – Resolved

- The revised BERA will include several lines of evidence in the risk characterization in an effort to explain the adverse effects to benthic macroinvertebrates observed at nine stations (seven stations in the Study Area and two in Westchester Creek) for which toxicity could not be explained based on porewater chemistry.
- In addition to retaining the lines of evidence and discussion included in the BERA, other lines of evidence will include but not be limited to bulk sediment comparisons, concentrations of individual compounds, DNAPL, and location.
- The risk characterization will include an evaluation of the relative scientific merits of the different lines of evidence.

10-day Sediment Toxicity Test Results – Still Under Dispute

- The NCG agrees that the 10-day study will be included in the revised BERA.
- However, the NCG does not believe the 10-day and 28-day test results should be given equal consideration, for a number of reasons including but not limited to the following:
  - The 28-day test results are ecologically more meaningful with respect to long-term contaminant exposures, and are more consistent with the risk questions in the BERA problem formulation.
  - USEPA guidance acknowledges that chronic tests are more toxicologically relevant, have greater resolution than acute tests, and are more appropriate for organisms that spend most of their time on site (USEPA 1994, 2014).
  - The NCG believes that the 10-day test protocol, which does not include feeding or renewal of the overlying water, may result in increased organism stress above that for which the test is designed to measure due to lack of available food at a number of locations in the Study Area.

Wildlife Exposure Modifying Factors – Still Under Dispute

- The NCG has agreed to use a range of exposure modifying factors (EMFs) in the uncertainty section of the baseline wildlife risk analyses.

- USEPA has stated they would like these ranges to be included in the risk characterization of the report, not confined to just the uncertainty section. The NCG believes the EMFs currently included in the risk characterization section of the BERA are technically justified based on the relevant scientific literature and site-specific data.

Selection of Wildlife TRVs – Resolved

- USEPA has approved the process used by the NCG to select TRVs for the wildlife risk assessment. The information presented to USEPA in updated versions of tables from the BERA report (see technical memorandum to USEPA from NCG dated January 20, 2017 [NCG 2017]) will be included in the revised BERA.
- The NCG has agreed that the risk estimates will be bounded by NOAEL-based HQs and LOAEL-based HQs.

Selection of Tissue Thresholds – Still Under Dispute

- The NCG has sent USEPA two technical documents clarifying the process used in the BERA to select tissue thresholds.
- USEPA is now requesting that the NCG use tissue thresholds from the Passaic site for some chemicals but has approved use of the NCG's approach and selection criteria for other chemicals.
- The NCG has evaluated the Passaic thresholds and finds that they do not meet the NCG's selection criteria presented in the USEPA-approved Phase 2 RI Work Plan Volume 1 (Anchor QEA 2014) and the January 20, 2017 technical memorandum to USEPA (NCG 2017). For example, several of the Passaic thresholds are based on behavioral endpoints rather than survival, growth, or reproduction endpoints, some are based on studies for which the study organisms were exposed to a mixture of chemicals rather than a single chemical, and others were derived by extrapolating from organ concentrations rather than based on whole body tissue concentrations.

White Perch – Resolved

- USEPA has agreed that the BERA does not need to include white perch fillet data in the quantitative risk analyses due to the low numbers of fish caught and the lack of whole body data.
- However, the NCG has agreed to include a qualitative comparison of white perch and striped bass fillet data in the BERA.

Polychaete-Sediment Regressions – Resolved

- USEPA has accepted that the NCG used measured polychaete tissue concentrations to calculate dietary intake for wildlife.
- For sediment locations for which measured tissue data are unavailable, the NCG will include an analysis in the revised BERA to support the use of biota-sediment accumulation factors (BSAFs), on a Study Area-wide basis or for Study Area segments in the baseline wildlife risk analyses.

NYSDEC Water Quality Standards – Unresolved

- NYSDEC has indicated that NYSDEC surface water quality standards (WQS) for the protection of wildlife and human health should be considered in the BERA porewater evaluation.
- The NCG does not agree because the WQS proposed by NYSDEC are not based on the protection of aquatic life and, thus, would not be appropriate for answering risk questions as set forth in the BERA problem formulation. Furthermore, these WQS were not included in USEPA's directed hierarchy at the beginning of the ecological process.

References

Anchor QEA (Anchor QEA, LLC), 2014. *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

NCG (Newtown Creek Group), 2017. *Newtown Creek Baseline Ecological Risk Assessment: Selection of Wildlife Toxicity Reference Values and Tissue Effect Thresholds*. Memorandum to U.S. Environmental Protection Agency. January 20, 2017.

USEPA (U.S. Environmental Protection Agency), 1994. *Using Toxicity Tests in Ecological Risk Assessment*. Eco Update. Office of Solid Waste and Emergency Response. Publication 9345.0-051. March 1994.

USEPA, 2014. *Toxicity Testing and Ecological Risk Assessment Guidance for Benthic Invertebrates*. Memorandum to the Environmental Fate and Effects Division (7507P), Office of Pesticide Programs. April 2014.

March 17, 2017: *Memo from City of New York on NCG BERA Dispute*. Prepared by NYCDEP, emailed by Chitra Prabhu to EPA and stakeholders (Subject: RE: Newtown Creek: BERA Dispute Meeting).

This memorandum provides a review of several dispute resolution issues outlined in the Newtown Creek Group's (NCG) letter to EPA Region 2 (NCG letter, 2017) for the City of New York (the City). Specific issues addressed here include:

1. The identification of confounding factors in the NCG development of correlations of toxicity vs pore water chemistry;
2. The physical effects of oil should be considered when interpreting toxicity test results;
3. The use of ten day toxicity testing in the assessment of benthic community risks;
4. The use of No Observed Adverse Effects Levels (NOAELs) in the risk assessment; and
5. The use of reference area data in the ecological risk assessment.
6. The estimation of BSAFs should follow Burkhardt's recommendations

1. THE IDENTIFICATION OF CONFOUNDING FACTORS IN THE NCG DEVELOPMENT OF CORRELATIONS OF TOXICITY VS PORE WATER CHEMISTRY

In recent technical discussions of the disputed areas, EPA has written that if NCG includes *"a robust discussion about other possible reasons for the toxicity (including but not limited to, bulk sediment comparisons, concentrations of individual compounds and DNAPL), the discussion and figures that were identified as needing to be deleted can remain in the document."* Adding additional robust discussion (as requested by EPA) does not justify the continued inclusion of the flawed NCG analysis in the Baseline Ecological Risk Assessment (BERA).

The NCG evaluated the relationship between a compound parameter, the sum of PAH TUs plus the sum of metal TUs, and toxicity test results using a selected set of triad data from the BERA field program. This evaluation has several large sources of uncertainty in the selection process and the approach, which should disqualify this evaluation from consideration in the BERA.

The NCG evaluation:

A. Selected a subset of triad stations for the analysis based on two highly uncertain and insufficiently supported criteria:
   i. Elevated C19 to C36 aliphatic hydrocarbons greater than the Stanley et al. (2010) mineral oil benchmark; and
   ii. TU less than 2 for porewater PAH (34) or SEM metals.

B. Attempted to correlate an unsupported compound parameter (sum of PAH TUs plus sum of metal TUs); and

C. Attempted to seek a correlation between metals and toxicity when in fact, the lines of evidence in the BERA indicate that metals are not likely to be toxic.

A. The NCG selected a subset of triad stations for the analysis based on two highly uncertain and insufficiently supported criteria.

In the BERA, the NCG selected a subset of triad stations for regression analysis based on two highly uncertain and insufficiently supported criteria: (1) elevated C19 to C36 aliphatic hydrocarbons greater than the Stanley et al. (2010) mineral oil benchmark and (2) TU less than 2 for porewater PAH (34) or SEM metals. On the basis of these two criteria, NCG eliminated nine stations (seven Newtown Creek stations and two reference area stations) from their analysis in an attempt to assign the cause of toxicity to the proximity of sample locations to CSOs or stormwater discharges. This was modified in the February, 2017 NCG summary memorandum to EPA (page 9), the rationale for the selection of these nine stations was characterized as *"stations for which the toxicity test results are not consistent with expected pore-water based concentration-response relationships"* and the results at these stations were explained by their spatial proximity to CSOs and municipal outfalls. Table 8-9 of that memorandum indicates that these stations were *"removed as confounding factors due to C19-C36 concentrations"*. The City comments that follow assume that the reasoning provided in the BERA is the operating rationale for station removal as the current dispute indicates that reasoning may stay as long as other lines of evidence are presented.

A.i. Mineral Oil Benchmark Should Not Be Used to Screen Triad Stations against Concentrations of C19 to C36 Aliphatics.

The NCG bases the first criteria, the mineral oil benchmark, on a long chain of weakly linked assumptions starting with the potential toxicity of Unresolved Complex Mixtures (UCMs), the measured toxicity of mineral oil, and a weakly supported argument that the mineral oil benchmark is reflective of toxicity from Extractable Petroleum Hydrocarbon (EPH) fraction C19 to C36. The assumptions required to develop this argument are too uncertain to be included in the risk assessment section of the BERA. The NCG attempts to make the case that hydrocarbon UCMs may be confounding toxicity in Newtown Creek sediments based on a chain of assumptions that vaguely implicate CSOs as the source of this confounding factor. The BERA uses the following chain of assumptions: (1) UCMs have been shown to be toxic to benthic organisms elsewhere (this is true of all COPCs); (2) saturated hydrocarbon (oil) has been shown to be as much as 90% UCM; (3) EPH was measured in Newtown Creek triad sediments; (4) EPH includes an aliphatic hydrocarbon range; (5) the literature offers an experiment that provided a LC-50 from a 10-day *Leptocheirus* test using mineral oil in which a concentration of 210 mg/kg elicited an effect, assumed to be physical; (6) mineral oils have carbon ranges of C15 to C50 and the boiling point of mineral oil, C19 alkane and C32 alkane are similar; (7) therefore, the 210 mg/Kg LC-50 for mineral oil is applied as a sediment benchmark for the C19 to C36 EPH fraction measured in Newtown Creek, which is assumed to be a good surrogate for mineral oil.

There are a number of flaws in this chain of logic that invalidate the development of a sediment benchmark for EPH including: (1) a lack of explanation about how specifically the comparison of alkane boiling points to mineral oil boiling points supports the toxicological extension to C19 to C36 EPH fractions; (2) the BERA's assumption that EPH is a reasonable surrogate for mineral oil based on the range of carbon numbers is not supported by Mount et al., 2010, who state that mineral oil is generally in the range C13 to C24 rather than the higher range in EPH C19 to C36 fraction; (3)The BERA ignores the range of LC-50s for mineral oil provided in their cited reference (Stanley et al., 2010) which indicates that the LC-50 ranges from 110 to 210 depending on the beaker size and number of test organisms.

In particular, the BERA applies no uncertainty factors, as is the standard of practice to the development of a benchmark, despite the various clear sources of uncertainty such as: (1)the BERA inappropriately uses the highest LC-50 reported for mineral oil (Stanley et al. 2010 also report a LOEC of 0.15 mg/kg); (2) the assumption that the C19 to C36 fraction of EPH is a surrogate for UCMs, which is a surrogate for petroleum products, a broad mixture; (3) as indicated above, there is a range of possible benchmarks ranging from 0.15 (LOEC) to 210 mg/kg (EC-50); and (4) these ranges of effect levels were derived from a 10-day exposure and thus may overestimate the exposures associated with more chronic exposures.

Further, the NCG has not proven that the elevated C19-C36 is due to CSOs or MS4s. No data has been presented to support attribution of elevated C19 to C36 fraction to CSOs and MS4s, and without the measurement of C19 to C36 compounds in the discharge, there is no basis to assign C19 to C36 compound contamination detected in the sediments to any point source discharges. Data is available at some upland sites, which shows C19 to C36 compound concentrations at high concentrations. For example, the C19 to C36 concentration in the soils at the upland site Quanta (former refinery), are elevated, with an average concentration of 480,000 mg/kg (nearly 50 percent). Without available data from all sources (upland Sites, NAPLs, CSOs and MS4s) the assertion by the NCG is arbitrary and needs to be deleted.

This uncertain benchmark should not be applied as a criterion to remove stations from an analysis of porewater chemistry vs toxicity.

A.ii. The Sum PAH TU <2 is an Inappropriate Screening Criteria for Triad Stations

The NCG uses a second selection criteria, TU of less than 2 for porewater PAH (34) or SEM metals to select triad stations to eliminate from their evaluation. The rationale for this criterion is that stations with a TU less than 2 for either of these parameters will select stations that are not predicted to be toxic due to exposure to either PAHs or metals. The application of this criterion results in the elimination of seven Newtown Creek stations. The criterion, however, misuses the EPA thresholds for predicting the likelihood of toxicity. That threshold TU specified by EPA for either SEM metals or PAHs is 1, not 2. Furthermore, EPA specifies the threshold as a categorical threshold, not a continuous variable. Specifically, EPA (Burgess et al., 2013) explicitly state that *"For the interstitial water approach. . .when the metal mixture interstitial water ESB >1, sediment toxicity due to metal mixtures may occur, while in cases where the ESB value is $\leq$ 1, toxicity due to metals is unlikely."* Similarly for PAHs, EPA (2003) states that *"Benthic organisms should be acceptably protected from the narcotic effect of PAH mixtures …if the ΣESBTU is less than or equal to 1.0 and if the ΣESBTU is greater than 1, sensitive benthic organisms may be adversely affected"* by direct toxicity. In both instances, the threshold is 1 rather than the value of 2 used in the NCG selection process. This unsupported inflation of the well documented EPA threshold results in the elimination of three stations in which the PAH TU is greater than 1. Using the correct threshold (1), these sediments are likely to be toxic, according to EPA methodology. The NCG is claiming these stations as having sediments that are not toxic due to PAH exposure when the EPA guidance explicitly states that they may be adversely affected, and in fact, these stations exhibited sediment toxicity consistent with the EPA prediction.

The application of this criterion allowed NCG to screen out three site stations from their analysis that had sum PAH TUs > 1, which indicates that these stations are likely to be toxic. NCG's raising the threshold to a value of 2 is not supported by EPA guidance regarding the application of the sum PAH ESB and results in an arbitrary screening of data from the analysis.

B. <u>NCG attempted to correlate an unsupported compound parameter (sum of PAH TUs plus sum of metal TUs) with toxicity.</u>

NCG provides no technical support for adding two independent parameters as one compound parameter in the evaluation of confounding factors. There is no toxicological reason to add these parameters. EPA guidance (EPA, 2003; Burgess, 2013) justify the sum PAH TU as an indication of whether a sediment sample may or may not be toxic based on the supported assumption that the individual PAHs in that summation are all acting with the same toxic mechanism, narcosis. EPA's use of the sum metals TU does not rest on the same assumption that the toxicological mechanism for the metals is narcosis. The metals may all have different modes of action, none of which EPA assumes are narcosis. NCG provides no evidence that there is any toxicological justification for adding these completely different and differently derived summations.

In addition, as described above, these parameters, sum AVS-SEM TU and sum PAH TU, are categorical in that they are interpreted based on a threshold. NCG has used these parameters as a continuous variable in a correlation without supporting the use in this manner.

C. <u>NCG attempts to seek a correlation between metals and toxicity when in fact, the lines of evidence in the BERA indicate that metals are not likely to be toxic.</u>

EPA (EPA, 2005; Burgess, 2013) explicitly recognize three lines of evidence that address whether sediment metals (the SEM metals) are likely to be bioavailable in their dissolved forms in pore water and therefore likely to be toxic.

The data in the BERA clearly demonstrate that the SEM metals are not a likely cause of toxicity in any of the sediment samples based on the EPA ESB methods and interpretive framework. Specifically, EPA (2005) states that "benthic organisms are sufficiently protected if the sediment meets either one of the following benchmarks":

(1) Σi [SEMi] ≤ [AVS]

or

(2) Σi [(Mi,d)/(FCVi,d)] ≤ 1.0 (for the five SEM metals)

In addition, EPA (2005) uses a third approach to refine the uncertainty associated with the benchmark:

(3) (ΣSEM-AVS)foc

EPA uses this TOC corrected SEM-AVS approach (item 3 above) to refine the uncertainty associated with the benchmarks and recognizes three interpretive levels, one of which is that if the (ΣSEM-AVS)foc < 130, then toxic effects are not expected.

The data in the BERA clearly indicates that metals are unlikely to be the cause of benthic toxicity based on the analysis methods presented above, EPA (2005). Specifically, among the 60 triad stations that NCG used in their analysis, every station met both conditions 1 and 3, indicating with considerable certainty that the benthic organisms are sufficiently protected from exposure to SEM metals in pore water. In addition, 44 stations met condition 2.

Using the interpretive methods from EPA (2005) and Burgess (2013) these data indicate that the benthic community is not at risk from exposure to SEM metals through direct contact at any of the 60 triad stations, because at least one of the first two criteria above are met and criteria 3 provides an added level of certainty that the benthic community is not at risk from direct exposure to SEM metals.

In the BERA, NCG applies the SEM-AVS benchmarks to "bulk sediment." However, the derivation of the SEM-AVS model by EPA (2005) clearly states that "*partitioning models can relate sediment* *concentrations for cationic divalent metals (and monovalent silver) on an AVS basis to the absence of freely-dissolved concentrations in interstitial water".*

SUMMARY - THE IDENTIFICATION OF CONFOUNDING FACTORS IN THE NCG DEVELOPMENT OF CORRELATIONS OF TOXICITY VS PORE WATER CHEMISTRY

The technical objections to the NCG approach presented in this Section 1 demonstrate the lack of a valid technical justification for: (1) the C19 to C36 screening criteria that NCG used to select stations for the correlation analysis; (2) the arbitrary selection of a toxicity unit threshold of two for the second screening criteria; and (3) the unsupported and toxicologically meaningless parameter that combines PAH and metal toxicity (sum PAH TU plus sum SEM TU). This lack of a technical justification for these NCG analyses is sufficient reason for these analyses to be removed from the BERA. In recent discussions between EPA and NCG, EPA risk assessors have indicated that these analyses are not compelling and do not demonstrate any relationship between CSOs and observed toxicity.

Inclusion of additional lines of evidence analysis requested by the EPA does not validate NCG's flawed reasoning on confounding factors and toxicity. This should be removed from the BERA. In addition, any new reasoning should be reviewed by all stakeholders before acceptance. Based on the deficient NCG submission it would be more effective if the EPA or the City developed the approach in the BERA, rather than have NCG submit another deficient analysis that would require further discussion, revision and possible subsequent resubmission.

2. THE PHYSICAL EFFECTS OF OIL SHOULD BE CONSIDERED IN INTERPRETING TOXICITY TESTS

The analysis of sediment toxicity and the evaluation of the source of toxicity in Newtown Creek should recognize that the City's measurement of sediment toxicity throughout Newtown Creek demonstrates that there are likely two populations of sediment samples based on clear differences in the visible presence of oil in the toxicity test samples (presence or absence), the higher concentrations of Total Petroleum Hydrocarbons (TPH) in those samples with visible presence of oil, obvious differences in toxicity (10- and 28-day survival), and the location of these stations in the upper reaches of Newtown Creek (Turning Basin and tributaries).

Figure 1 shows the locations of sediment toxicity test samples where the laboratory (USACE ERDC lab Vicksburg, MS) observed evidence (sheens, NAPL) of separate phase oil in test samples. Most of the samples in the upper reaches of the Newtown Creek exhibited visible evidence of oil contamination. Concentrations of TPH in these upper reach stations were compared to the TPH concentrations in stations in lower Newtown Creek. Figure 2 shows that these two groups (lower Newtown and upper reach stations) have notably different concentrations of TPH.

A comparison of the 10-day toxicity (Figure 3) and the 28-day toxicity (Figure 4) show that these two groups have very different toxicological responses. These differences may be due to the physical effects that oil has on the respiratory systems of marine invertebrates. These data suggest, but do not test this hypothesis (if the hypothesis is correct, then it would be futile to seek a chemical cause for toxicity in those stations where the physical effects of oil are killing the organisms before any chemical effects can be realized). However, it is clear from these figures that there appears to be a bimodal and discontinuous distribution of toxicity in the samples tested by the City and that this bimodal distribution can be described by station differences in observations of oil, concentrations of TPH, and location in the upper reaches of the creek. This distribution calls into question the validity of attempts to assign singular and similar sources of toxicity to the pooled group of stations in Newtown Creek.

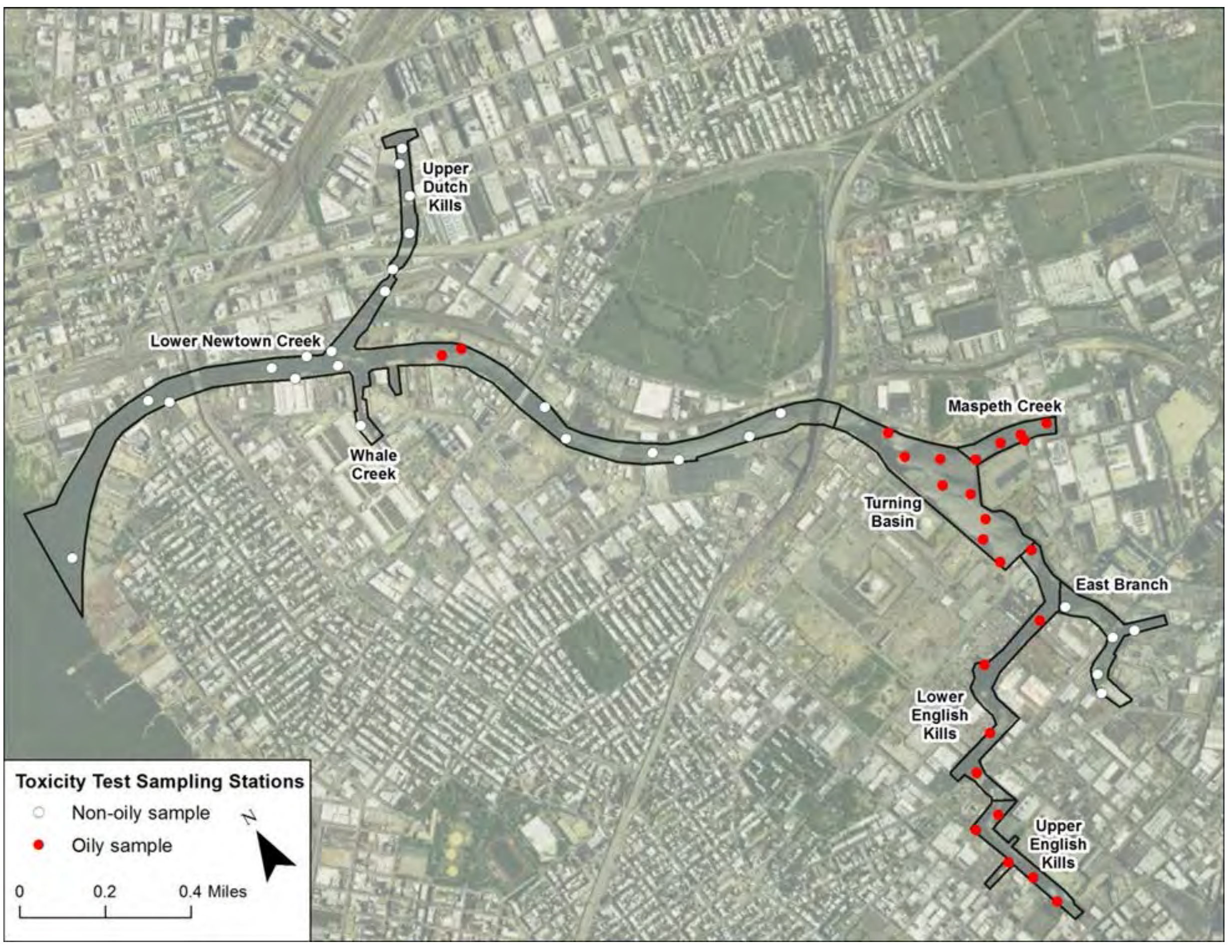


Figure 1. Visual observations of oil in the toxicity test sediment samples

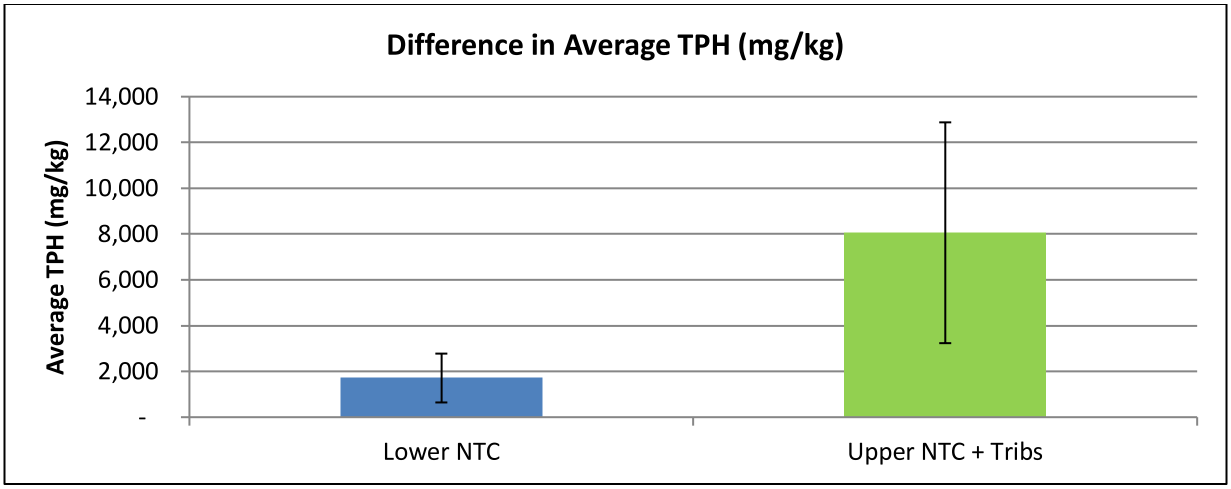


Figure 2. Average TPH (mg/kg) concentrations in Lower Newtown Creek (blue) and Upper Newtown Creek and tributaries (green). Error bars represent one standard deviation

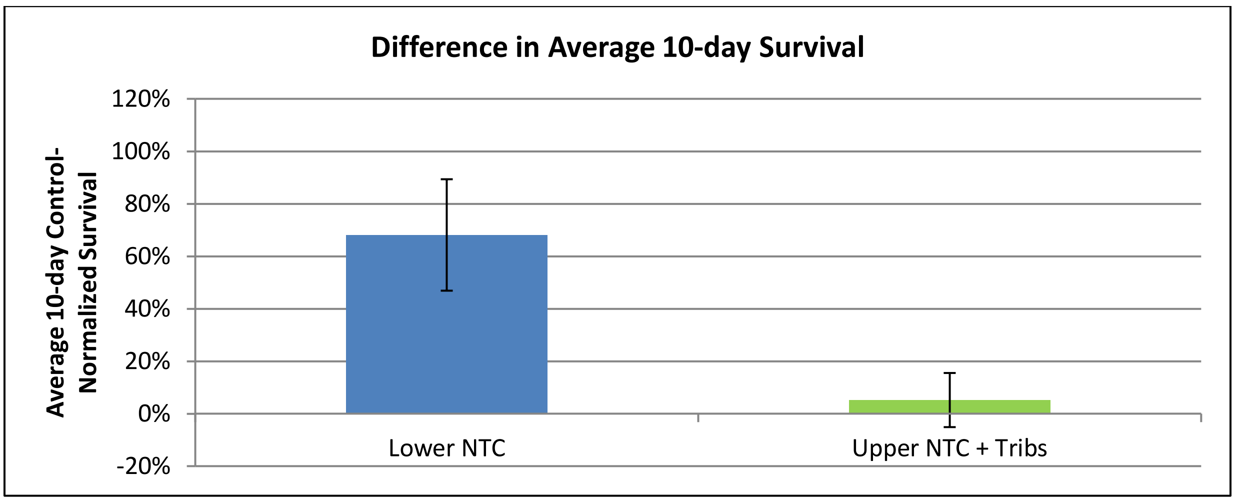


Figure 3. Comparison of 10-day survival results in Lower Newtown Creek (blue) and Upper Newtown Creek and tributaries (green). Error bars represent one standard deviation

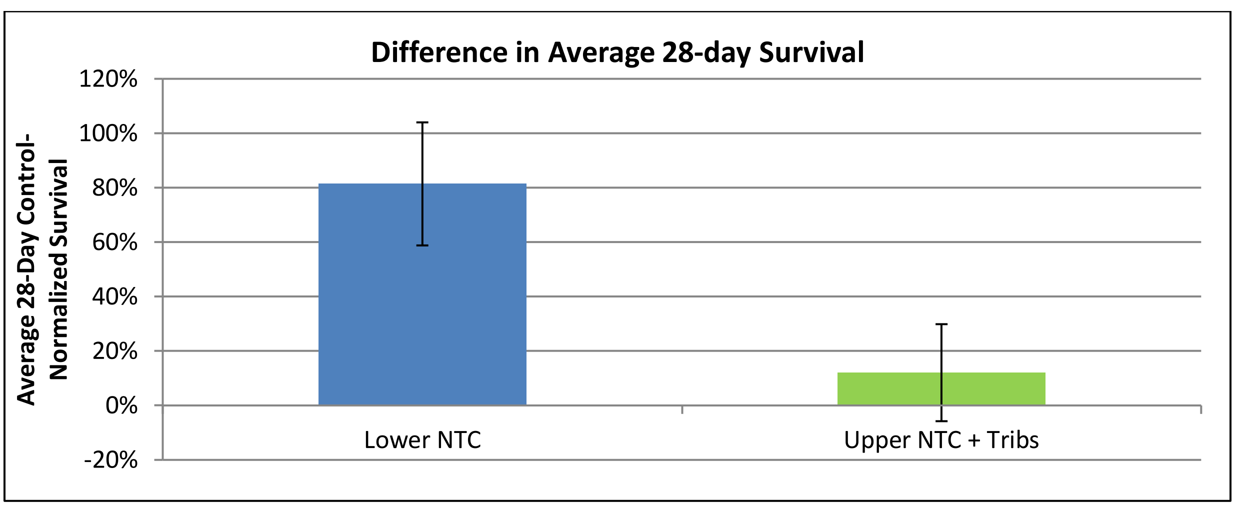


Figure 4. Comparison of 28-day survival results in Lower Newtown Creek (blue) and Upper Newtown Creek and tributaries (green). Error bars represent one standard deviation.

3. THE USE OF TEN DAY TOXICITY TESTING IN THE ASSESSMENT OF BENTHIC COMMUNITY RISKS

The toxicity testing shows that:

- The 10-day and 28-day tests were conducted according to standard methods, and met their respective performance standards. There is no compromise or bias in either of these tests;
- These tests should be interpreted in light of their different purposes and methods for assessing acute toxicity in the case of the 10-day test and chronic (including sub-lethal endpoints) in the case of the 28-day test;
- The NCG argument regarding the variability of one test over the other is simply a misreading of the literature that they cite regarding this topic.

NCG incorrectly characterized the 10-day toxicity tests as "compromised", noting the feeding and water change differences between the 10- and 28-day toxicity test protocols. Both the 10- and 28-day toxicity tests conducted for Newtown Creek followed standard, approved protocols, and met all required conditions throughout the tests. The controls had acceptable survival in the 10-day tests, indicating that test conditions did not compromise the testing. Therefore, the results of both tests are equally valid for their individual purposes.

Various federal agencies recognize that these two tests are separate and independent measures of either acute or chronic toxicity (EPA, 2014; EPA, 1997; USACE and EPA Region 2, 2016). As such, one cannot be characterized as biased in comparison to the other. They are measuring different properties. The discrepancy between 10- and 28-day survival results is not due to a "compromised" 10-day test, but rather to the inherent differences between the two tests. As NCG pointed out, the tests differ in feeding and water change regimes. They also differ in light regime. In a 10-day toxicity test, *L. plumulosus* is kept under a 24-hour light regime. Since the organisms innately avoid light, this effectively drives the organisms into the sediment for the entire duration of the test. Constant immersion in the sediment allows *L. plumulosus* to act as surrogates for burrowing benthic macroinvertebrates that are in constant contact with the sediment. In a 28-day test, the light regime is adjusted to a more natural cycle (16 hours of light followed by 8 hours of darkness each day). In the absence of direct light, *L. plumulosus* are more likely to exit the sediment and swim in the overlying water. This change in conditions is less about providing a more hospitable environment for the organisms, and more about providing conditions in which the organisms will mate (a necessary precursor for measuring reproduction as an endpoint). These are different lines of evidence, each with its own separately developed methodology for different purposes. The 10-day test is designed as an indication of acute toxicity, while the 28-day test is designed as an indicator of sublethal toxicity.

NCG, in their response to EPA comments, cites a paper (Kennedy et al. 2009), claiming that it demonstrates the variability of the 10-day test, and NCG states that *"in an ecological risk assessment, a 10-day test measuring acute effect is not as strong of a line of evidence as a 28-day test measuring chronic endpoints"*. However, Kennedy et al. (2009) actually demonstrate the opposite in terms of variability. They note that the *"10-d A. abdita, 10-d L. plumulosus and 28-day L. plumulosus tests were comparable between laboratories,"* but note that *"intra-treatment sub-lethal endpoint variability was greater"* and *"chronic L. plumulosus test method was less consistent among laboratories relative to acute test methods"* and the authors demonstrate that the 28-day sub-lethal endpoints may be either more or less sensitive than the 10-day acute test in identifying toxicity. The results of the Kennedy et al. paper do not support the NCG statements regarding variability, or bias of the 10-day test.

Subsequently in their recent (March 10, 2017) summary letter regarding the dispute resolutions, NCG cites EPA, 1994 and EPA 2014 to support the position that the chronic tests are more appropriate. The EPA, 2014 is a memo from EPA office of pesticides that addresses the testing of a single chemical (new pesticide registrations) and recommends the use of subchronic tests (10-day) when new pesticide half-lives are short, and chronic tests (28-day) when new pesticide half-lives are longer. The cited guidance is not appropriate for a mixed chemical testing that occurs at a Superfund site. The EPA, 1994 guidance does not address 10-day vs 28-day tests but sets some general recommendations regarding the use of chronic and acute tests, which EPA defines as 24 to 96 hour tests (much less than the 10-day test used at the Newtown Creek site).

The City is in agreement with EPA that the 10-day toxicity test is a standard, well-documented, and unbiased toxicity test and is valid as a separate, independent, and equally weighted line of evidence for assessing risk to benthic invertebrates. As such, the ten day test carries as much weight as the 28 day toxicity test.

4. THE USE OF NOAELS IN THE ASSESSMENT OF ECOLOGICAL RISK

The BERA uses both NOAELs and Lowest Observed Adverse Effects Level (LOAELs). NOAELs are applied in the Phase II screening process (Section 5). LOAELs are applied in Wildlife Risk Assessment in Section 11. The application of NOAELs in the risk screening is appropriate, the Risk Assessment Guidance for Superfund (EPA 1997) is clear that both a NOAEL and LOAELs are needed to bound the wildlife risk estimates. EPA (1997) emphasizes how these effects values should be included and states:

> *Section 7.3.1: "Key outputs of the risk characterization step are contaminant concentrations in each environmental medium that bound the threshold for estimated adverse ecological effects given the uncertainty inherent in the data and models used. The lower bound of the threshold would be based on consistent conservative assumptions and*

> *NOAEL toxicity values. The upper bound would be based on observed impacts or predictions that ecological impacts could occur. This upper bound would be developed using consistent assumptions, site-specific data, LOAEL toxicity values, or an impact evaluation."*

Additionally, EPA (1997) discusses that the threshold for potential effects is a range between the no effect level and the lowest effect level. The guidance states (EPA 1997),

> *Section 7.5: "Risk characterization integrates the results of the exposure profile and exposure-response analyses, and is the final phase of the risk assessment process. It consists of risk estimation and risk description, which together provide information to help judge the ecological significance of risk estimates in the absence of remedial activities. The risk description also identifies a threshold for effects on the assessment endpoint as a range between contamination levels identified as posing no ecological risk and the lowest contamination levels identified as likely to produce adverse ecological effects."*

The NCG wildlife risk assessment is incomplete because it ignores exposures that exceed the NOAEL but are less than the LOAEL, and misses chemical exposures that may result in risk. The use of the NOAELs and LOAELs would change the conclusions of the risk characterization.

NCG should revise the BERA wildlife risk characterization and include comparison of the BERA TDIs to NOAELs in addition to LOAELs.

5. THE USE OF REFERENCE AREA DATA IN THE ECOLOGICAL RISK ASSESSMENT

Recently (February 3, 2017), EPA issued an email explaining their plan for screening the reference area stations. They concluded that utilizing all 8 original reference area selection criteria to screen out sites with high contaminant levels would result in too few stations for a robust comparison. They therefore chose a single criterion (Mean PEC-Q using 17 PAHs) as their screening criteria. EPA states that 0.52 was the highest Mean PEC-Q for the four selected reference areas during the ranking process, but then decided that any station with a Mean PEC-Q above 0.55 would be considered an outlier. Using 0.55 as a cut-off value, 6 stations (4 from Westchester Creek, 1 from Head of Bay, and 1 from Spring Creek) are removed. If 0.52 had been used as a cut-off, an additional 2 sites would have been considered outliers (1 from Gerritsen Creek and another from Westchester Creek). Additionally, EPA directed that comparisons to reference areas be conducted in two ways:

1. Reference Envelope Approach: remove the 6 identified outliers from the analysis
2. Individual Reference Area Comparisons: no removal of outliers; all stations will be used

Questions that arise from this:

1. How was 0.55 chosen? There seems to be a logic step missing from “0.52 was the highest Mean PEC-Q for the four selected reference areas during the ranking process” and “therefore any Mean PEC-Q above 0.55 will be considered an outlier.”
2. How will reference areas, specifically values generated using the reference envelope approach, be used? As toxicity test reference areas? Or to calculate background concentrations?
3. How will individual reference area comparisons be interpreted? For example, a single station might be toxic compared to Spring and Gerritsen Creeks but not toxic when compared with Head of Bay or Westchester Creek. Will that station ultimately be deemed toxic or non-toxic? It will be important to determine an analysis methodology up front so it does not appear that methods are being selected after-the-fact in order to select a desired outcome.

The EPA recommendations appear to be exploratory in nature and do not adopt specific methods for comparing site and reference areas or making comparisons among reference areas. EPA should specify a clear and explicit methodology for making such comparisons and provide a clear basis for making decisions based upon the results emanating from the application of these methods.

There are real implications because the stations used as reference will affect (1) what is considered toxic at the site (the cleaner the reference area, the more likely that a site station will be toxic in comparison), and (2) may also affect what EPA considers as a background concentration and therefore what the clean-up level should be.

Discrete Comparisons to Each Reference Area:

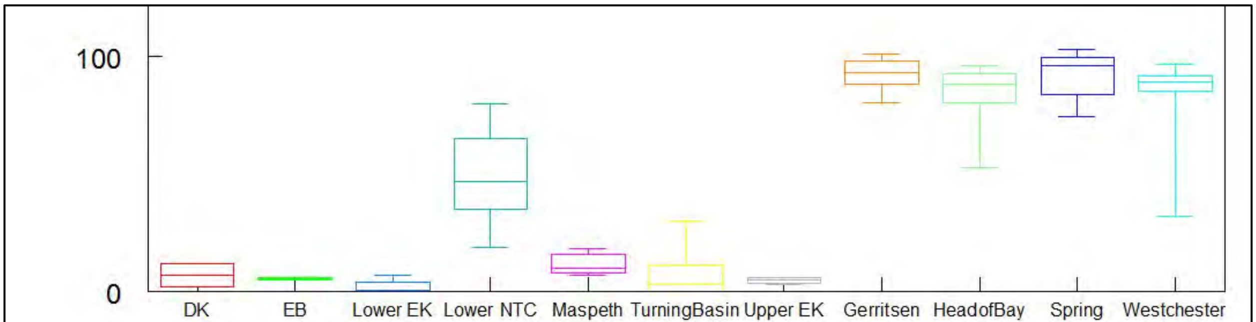
The EPA directs NCG to compare the toxicity and benthic data in the Study Area to each reference area separately. NCG maintains that the work plan requires that the data from all reference areas be lumped. However, the work plan is vague on this issue, and can easily be interpreted to support either approach. Specifically the language in Table 2.2 of the RI Work Plan Volume 1 states that 10- and 28-day toxicity test results should be evaluated through a *"comparison of survival, growth and reproduction of amphipods in Study Area sediments to reference area sediments,"* and that benthic macroinvertebrate metrics should be evaluated through a *"comparison of metrics to reference locations."*

The directions for how to use this information in the ecological risk assessment are vague, and are not clear whether study area data should be compared to each individual reference area separately or all reference area data combined.

Consequences of Individual Reference Area Comparisons

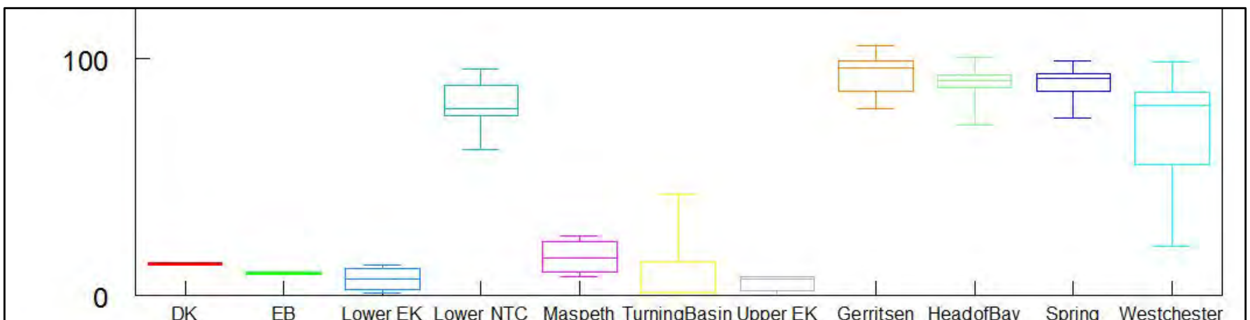
It is not clear how EPA can accomplish their stated goal of using the individual comparisons to clarify the separate contributions of CSOs vs Industrial discharge. In comment ID No. 125, the EPA states that "*the reason four areas were selected that represented four separate categories was to collect data to determine if specific sources of contamination (i.e., industrial discharges and CSO discharges) could be distinguished from each other."*

The City has previously compared the study area and individual reference area toxicity test results from the NCG program. Figures 5 and 6 show these comparisons for both 10- and 28-day toxicity tests. These figures show how closely the results from all four reference areas are to each other, and how divergent all the study area sites are from any individual reference area. Therefore, whether the site stations are compared to the combined reference areas, or to each reference area separately, the results will be the same. Reference area toxicity data shows that toxicity is not correlated with presence of CSOs (or MS4s, which are also an input at all of these reference areas).



	DK	EB	Lower EK	Lower NTC	Maspeth	TurningBasin	Upper EK	Gerritsen	HeadofBay	Spring	Westchester
SIZE	2	2	4	15	3	5	3	12	12	12	12
5%	2	5	0	18.5	7	0	3	80.5	52.9	74.5	32.2
10%	2	5	0	26	7	0	3	83.5	64.3	77.5	33.4
25%	2	5	0	34.75	7.75	0	3.5	88	80.5	84	85.5
MEDIAN	7	5.5	0.5	47	10	3	5	93	88	96	89
75%	12	6	4	65	16	11.25	5.75	98	92.5	99.5	91.5
90%	12	6	7	70	18	30	6	100.3	95.3	101.6	95.6
95%	12	6	7	79.75	18	30	6	100.9	95.9	102.8	96.8
MEAN	7	5.5	2	48.7333	11.6667	7.6	4.6667	92.3333	84.3333	91.9167	80.6667
STDDEV	7.0711	0.7071	3.3665	18.7711	5.6862	12.7004	1.5275	6.4149	12.8794	9.6903	22.5483
STDERR	5	0.5	1.6833	4.8467	3.283	5.6798	0.8819	1.8518	3.718	2.7973	6.5091
NOTCH	11.1304	1.113	3.1481	12.2943	7.4975	7.9194	2.0448	4.544	5.4528	7.0431	2.7264

Figure 5. NCG 10-day toxicity test survival data: reach-by-reach comparison.



	DK	EB	Lower EK	Lower NTC	Maspeth	TurningBasin	Upper EK	Gerritsen	HeadofBay	Spring	Westchester
SIZE	2	2	4	15	3	5	3	12	12	12	14
5%	13	9	1	61.5	8	0	0	79	71.8	74.9	20.6
10%	13	9	1	66	8	0	0	79	76.6	80.3	43.7
25%	13	9	2.5	76	10	0	1.75	86.5	87.5	86.5	55
MEDIAN	13.5	9.5	7	79	16	1	7	96	90.5	91.5	80.5
75%	14	10	11.5	88.75	22.75	14.5	7.75	99	93	93.5	86
90%	14	10	13	95	25	43	8	101.8	96.8	98.3	93.7
95%	14	10	13	95.75	25	43	8	105.4	100.4	98.9	98.6
MEAN	13.5	9.5	7	81.3333	16.3333	9.8	5	93	89.1667	89.9167	72.2143
STDDEV	0.7071	0.7071	5.4772	10.4994	8.5049	18.6735	4.3589	8.7074	7.7557	6.8684	23.0023
STDERR	0.5	0.5	2.7386	2.7109	4.9103	8.351	2.5166	2.5136	2.2389	1.9827	6.1476
NOTCH	1.113	1.113	7.0833	5.1819	11.5871	10.2072	5.4528	5.68	2.4992	3.1808	13.0414

Figure 6. NCG 28-day toxicity test survival data: reach-by-reach comparison.

6. THE ESTIMATION OF BSAFS SHOULD FOLLOW BURKHARDT'S RECOMMENDATIONS

EPA required that BSAFs be developed for each of the Study Area segments, rather than for the Study Area as a whole. The estimation of BSAFs should follow the recommendations developed by EPA (Burkhardt 2009), which include:

- Estimating the BSAF as the ratio of lipid normal tissue concentrations to TOC normal sediment concentrations;
- Estimating the BSAF by averaging paired measurements of lipid normalized tissue and TOC normalized sediment from areas with similar conditions rather than the use of the slope of a regression line using these parameters; and
- Not combining paired data from areas with highly heterogeneous conditions (as occurs among the various reaches of Newtown Creek).

There are 13 stations (with five replicates per station) with paired polychaete and sediment chemistry data from the bioaccumulation testing (Figure 7). Dutch Kills, East Branch, Maspeth Creek, and Whale Creek have only one station each. English Kills has two stations, the Turning Basin has three stations and lower Newtown Creek has four stations. Therefore, there is no way to estimate variability within a segment for those segments that have only one or two stations. The City recommends that NCG follow the Burkhardt (2009) recommendations and:

- Combine only those stations that have similar conditions (e.g. grain size, TOC, etc.);
- Calculate a BSAF for those areas of similar conditions as the average of the paired data; and,
- Use both lipid normal and TOC normal parameters to make the calculations.

TOC was not measured in the replicate bioaccumulation tests. These calculations should be made using the TOC measured with the bulk sediment chemistry.

Figure 7. NCG Phase II Bioaccumulation Sampling Sites

References:

Burgess, R.M., W.J. Berry, D.R. Mount, and D.M. Di Toro. 2013. Mechanistic sediment quality guidelines based on contaminant bioavailability: equilibrium partitioning sediment benchmarks. Environmental Toxicology and Chemistry. 32(1):102-114.

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EPA. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. Washington, DC: US Environmental Protection Agency, Solid Waste and Emergency Response. EPA 540-R-97-006. June 1997.

EPA. 2003. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures. U.S. Environmental Protection Agency, Office of Research and Development. EPA-600-R-02-013. November 2003.

EPA. 2005. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc). United States Environmental Protection Agency. EPA-600-R-02-011.

EPA. 2014. Memorandum on Toxicity Testing and Ecological Risk Assessment Guidance for Benthic Invertebrates, FROM: Donald J. Brady, Ph.D., Director, Environmental Fate and Effects Division (7507P), Office of Pesticide Programs; TO: Environmental Fate and Effects Division (7507P) Office of Pesticide Programs.

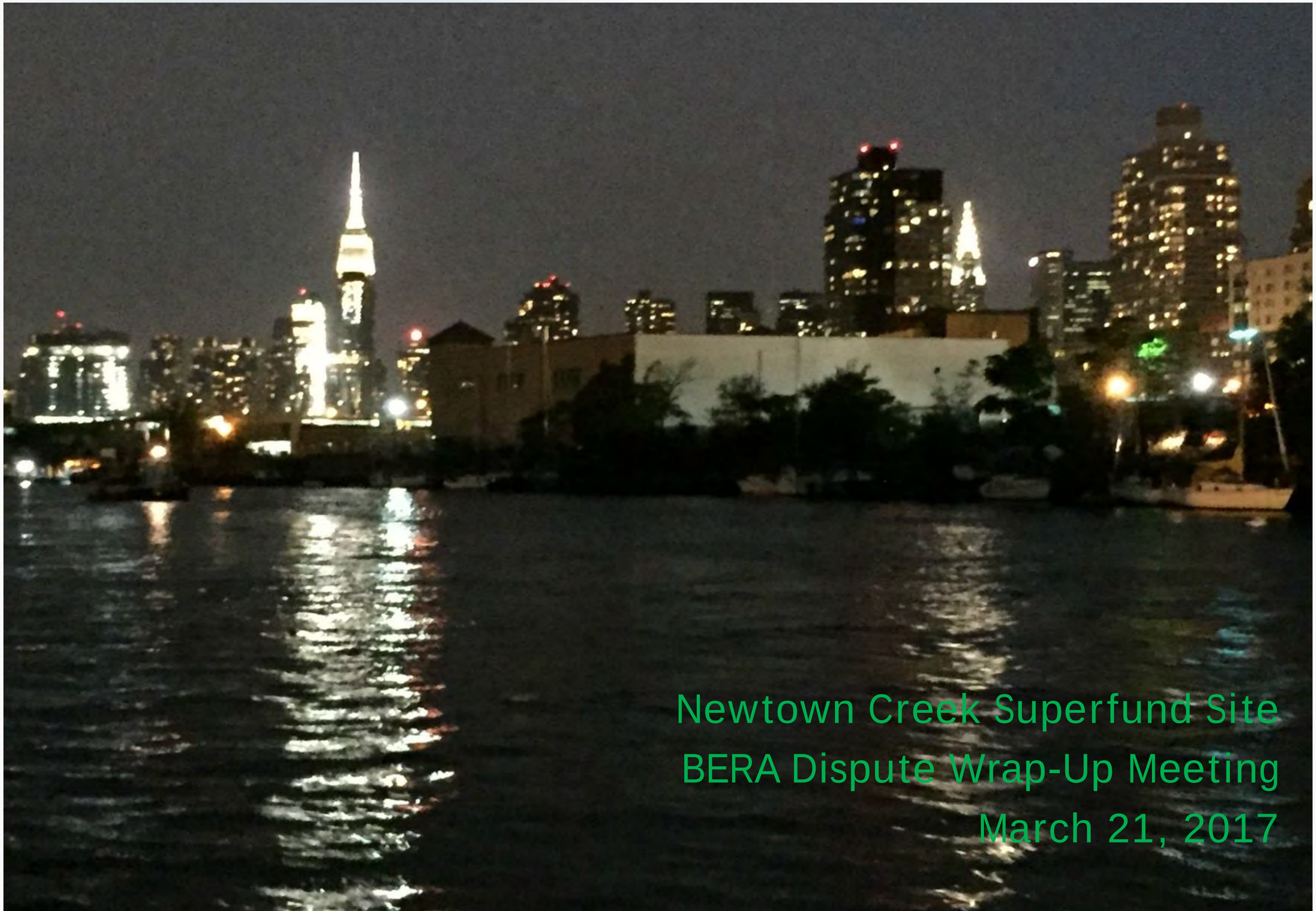
Kennedy, A.J., J.A. Stevens, G.R. Lotufo, J.D. Farrar, M.R. Reiss, R.K. Kropp, J. Doi, and T.S. Bridges. 2009. Comparison of Acute and Chronic Toxicity Methods for Marine Sediments. Marine Environmental Research, Elsevier, 2009, 68 (3), pp.118.

Mount, DR. 2010. Considerations for Predicting the Effects of Petroleum in Sediments. Office of Research and Development National Health and Environmental Effects Laboratory, Mid-Continent Ecology Division, Duluth, MN.

Stanley et al., 2010. Evaluation of reduced volume procedures for acute toxicity tests using the estuarine amphipod, Leptocheirus plumulosus. Env. Tox. Chem. 29(12):2769-2766

USACE and EPA Region 2, 2016. Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal, Final April 2016

March 21, 2017: *Newtown Creek Superfund Site BERA Dispute Wrap-up Meeting*, Power Point presentation slides prepared by EPA Region 2 for the BERA Dispute Wrap-Up meeting. Forwarded as a pdf file to NCG and stakeholders via 3/21/17 email from Stephanie Vaugh (Subject: RE: Newtown Creek: Dispute Meeting Revised Agenda).



Newtown Creek Superfund Site

BERA Dispute Wrap-Up Meeting

March 21, 2017

Reference Areas – Censoring the Data Set

- Censoring Reference Area data to address outliers is appropriate, and supported by EPA's *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (2002).
- Addressing outliers in Reference Envelope data is discussed in the literature – examples include:
  - *The Reference Condition: A Comparison of Multimetric and Multivariate Approaches to Assess Water-Quality Impairment Using Benthic Macroinvertebrates*. T. B. Reynoldson, R. H. Norris, V. H. Resh, K. E. Day and D. M. Rosenberg. Journal of the North American Benthological Society, Vol. 16, No. (Dec., 1997),pp. 833-852
  - Hunt, et al. 2001. *Evaluation and Use of Sediment Toxicity Reference Sites for Statistical Comparisons in Regional Assessments*, ET&C Vol. 20, No 6.
- Gowanus Canal and LPRSA are R2 examples that used outlier analyses to censor reference data set prior to Reference Envelope analysis.
- **Thus, EPA Region 2 supports censoring outlier data points from Reference Area data sets**

Reference Areas – Use of PEC-Q

- PEC-Q was one of the eight criteria originally used by EPA during the selection of Reference Area locations.
- Use of the mean PEC-Q method including the PAH-17 is appropriate because of the eight criteria, mean PEC-Q as a single criterion, resulted in same selection of Reference Areas.
  - Portland Harbor site qualified Reference Envelope locations using chemistry (mean PEC-Q and ESB-TU_{PAH}) and toxicity results.
  - Anniston PCB Site (Alabama) qualified Reference Envelope locations using PEC-Q and toxicity results.
- **EPA concurs with NCG regarding the use of PAH-17 in calculating the mean PEC-Q**

Reference Areas – Conversion of PCB Data

- For Newtown Creek Data – Phase 1 Total PCB Aroclor data were biased low compared to co-located Total PCB congener data. For the RI, NCG, using regression analysis, showed Total PCB Aroclor x 1.75 = Total PCB congeners.
- Conversion factor was for Total PCBs.
- The Newtown Creek site-specific conversion factor was likely due to the analytical method and sediment matrix. There is no evidence that the Reference Area locations would follow the same pattern, and there is no co-located Aroclor/congener data from the Reference Areas.
- Phase 2 data were all congener analyses.
- Converting Phase 2 Total PCB congener data to Total PCB Aroclor by dividing by 1.75 would yield arbitrary and possibly artificially low Total PCB concentrations
- **EPA recommends using the Phase 2 Total PCB congener data to derive the mean PEC-Q, using a value of 0.55 as an acceptability criteria, with no conversion**
  - If a Total PCB conversion is determined to be undertaken, the Phase 1 Total PCB Aroclor data should be converted to Total PCB congener data to recalculate the Phase 1 PEC-Q results.

10-Day Sediment Toxicity Study

- 10-Day study is a standard method that has been successfully used for decades, and is as valid as the 28-Day study.
- Chronic assay measures longer exposure, but acute assay measures the impact of sediment consumption by benthic invertebrates.
- Any stress that may have been on the Study Area exposures was also on the laboratory control and Reference Area exposures, and results were control-normalized.
- **EPA concludes that the 10-Day study should be given equal weight as other toxicity tests.**

Wildlife Exposure Modifying Factors (EMFs)

- Inclusion of multiple EMFs (0.25, 0.5, 0.75, and 1) should be in the risk characterization section of the BERA, and not split between the risk characterization and uncertainty sections.
- Multiple EMFs better represents the potential exposure risks to not just the specific species mentioned in the BERA, but to the feeding guilds for which they are surrogates
- Multiple EMFs parallels the Human Health RME and CTE scenarios in the risk characterization
- **EPA concludes that the analysis using multiple EMFs should be in the risk characterization section, with discussion of the uncertainty between factors presented in the uncertainty section.**

Selection of Tissue Thresholds

- The toxicological benchmarks used in the Lower 8.3 Mile Passaic River RI/FFS/BERA were appropriate and technically sound.
- When selecting toxicity thresholds using only values for survival, growth and reproduction, other effects (e.g., behavior, life cycle) which can significantly impact survival, growth and reproduction are ignored.
- **An acceptable alternative would be to use both the Lower 8.3 Mile Passaic River FFS values and the alternate values derived by NCG to bound the upper-end of the risk range.**

April 4, 2017: NYSDEC email reply (subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment).

From: Ian Beilby <ian.beilby@dec.ny.gov>
Sent: Tuesday, April 04, 2017 3:53 PM
To: Sivak, Michael; Kwan, Caroline
Cc: Vaughn, Stephanie; Schmidt, Mark; Mintzer, Michael; Quail, Rebecca A (DEC); Leonard, Edward L.; Weissbard, Ron; David.bridgers@wallerlaw.com; Nace, Charles; Cooke, Daniel W.; Tom Schadt; David Haury; Amron, Susan
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Michael,

NYSDEC agrees with EPA's recommendations and conclusions as expressed in EPA's March 21, 2017 slide deck.

Please let me know if you need anything further.

Ian Beilby, P.E.
Environmental Engineer 1 (Environmental)
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, Albany, NY 12233-7016
P: (518) 402-9767 | F: (518) 402-9773 | ian.beilby@dec.ny.gov

www.dec.ny.gov | |

From: Sivak, Michael [mailto:Sivak.Michael@epa.gov]
Sent: Monday, April 03, 2017 10:42 AM
To: Beilby, Ian A (DEC) <ian.beilby@dec.ny.gov>; Kwan, Caroline <kwan.caroline@epa.gov>
Cc: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Quail, Rebecca A (DEC) <rebecca.quail@dec.ny.gov>; Leonard, Edward L. <leonardel@cdmsmith.com>; Weissbard, Ron <RWeissbard@dep.nyc.gov>; David.bridgers@wallerlaw.com; Nace, Charles <Nace.Charles@epa.gov>; Cooke, Daniel W. <cookedw@cdmsmith.com>; Tom Schadt <tschadt@anchorqea.com>; David Haury <dhaury@anchorqea.com>; Amron, Susan <samron@law.nyc.gov>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Ian,

Thank you for your reply. However, your note does not say what information from the emails cited were reviewed, and what DEC's positon on this information, both on information provided by EPA and AQ, is.

As soon as possible, please provide clarification on what DEC's position is on the outstanding technical issues so that DEC's input can be considered by EPA in the resolution.

Michael Sivak
212.637.4310

From: Beilby, Ian A (DEC) [mailto:ian.beilby@dec.ny.gov]
Sent: Wednesday, March 29, 2017 11:46 AM
To: Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>
Cc: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Quail, Rebecca A (DEC) <rebecca.quail@dec.ny.gov>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Michael,

Thanks for following up.

I have reviewed the following pertinent materials as part of the dispute resolution process:

1. emails from Stephanie Vaughn to J. Quadrini on 2/17 and 2/21
2. the EPA presentation of 3/21
3. email from Caroline Kwan to D. Haury on 3/21

Based on the EPA's positions reflected in those materials, the DEC has only one outstanding issue. This issue was raised to Dan Cooke of CDMSmith and copied EPA staff on 3/24 as part of our original Aldrin/Dieldrin (bioaccumulative) COPC concerns and is related to a note on one of the BERA Tables:

Table 8-4c
Notes:
a = The chronic threshold values used for chlordane, alpha- (Chlordane, cis-), chlordane, beta- (Chlordane, trans-), and hexachlorobenzene were revised from the surface water risk screening to be protective of aquatic life; the values in the surface water risk screening were for the protection of wildlife.

The DEC has not been able to determine the method that was used to "revise" the surface water risk screening value to a pore water-specific screening value. It is hoped that EPA can assist with our understanding of this revision outside of the resolution process or ask NCG to clarify the process that was used.

- Thank you.

Ian

From: Sivak, Michael [mailto:Sivak.Michael@epa.gov]
Sent: Tuesday, March 28, 2017 4:53 PM
To: Beilby, Ian A (DEC) <ian.beilby@dec.ny.gov>; Kwan, Caroline <kwan.caroline@epa.gov>
Cc: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Ian,

Please let me know if you plan to send comments from NYS DEC on the items still under dispute. Thank you.

Michael Sivak
212.637.4310

From: Sivak, Michael
Sent: Wednesday, March 22, 2017 7:57 AM
To: 'Beilby, Ian A (DEC)' <ian.beilby@dec.ny.gov>; Kwan, Caroline <kwan.caroline@epa.gov>
Cc: Jim Quadrini <jquadrini@anchorqea.com>; Quail, Rebecca A (DEC) <rebecca.quail@dec.ny.gov>; David Haury <dhaury@anchorqea.com>; Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Edward Leonard <leonardel@cdmsmith.com>; Cooke, Daniel W. <cookedw@cdmsmith.com>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Ian:

I am sorry that you were not able to participate in the wrap-up meeting for the dispute resolution yesterday afternoon. However, in order for me to be able to consider NYS DEC's view on the issues that will be addressed in the dispute resolution, it would be helpful for you to provide written comments from the State on these issues, or to identify any particular matter that the State wants to bring to my attention. The meeting will start at 2 PM and I expect that it will continue until 4:30 PM or perhaps later.

I anticipate that I will issue my written decision by April 4, so any written comments that you provide should be sent to me as soon as possible.

Michael Sivak
212.637.4310

From: Beilby, Ian A (DEC) [mailto:ian.beilby@dec.ny.gov]
Sent: Tuesday, March 21, 2017 11:18 AM
To: Kwan, Caroline <kwan.caroline@epa.gov>
Cc: Jim Quadrini <jquadrini@anchorqea.com>; Quail, Rebecca A (DEC) <rebecca.quail@dec.ny.gov>; David Haury <dhaury@anchorqea.com>; Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Sivak, Michael <Sivak.Michael@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Edward Leonard <leonardel@cdmsmith.com>; Cooke, Daniel W. <cookedw@cdmsmith.com>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Caroline,

I will most likely not be able to attend this afternoon's meeting/call due to its rescheduling. Feel free to reach out to me if there are any items that I need to follow-up on.

Ian

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www.dec.ny.gov | |

From: Kwan, Caroline [mailto:kwan.caroline@epa.gov]
Sent: Tuesday, March 21, 2017 9:43 AM
To: David Haury <dhaury@anchorqea.com>; Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Sivak, Michael <Sivak.Michael@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; Beilby, Ian A (DEC) <ian.beilby@dec.ny.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>; Mintzer, Michael <Mintzer.Michael@epa.gov>; Edward Leonard <leonardel@cdmsmith.com>; Cooke, Daniel W. <cookedw@cdmsmith.com>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David.bridgers@wallerlaw.com; Linda Logan <llogan@anchorqea.com>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

David:

This is in response to NCG's Summary of Dispute referenced in your email below on the NYSDEC WQS.

The Draft BERA written by Anchor QEA for the Newtown Creek site was submitted to EPA in February 2016. EPA reviewed the document, and issued comments on 6/11/16. The NCG responded to the comments on 11/4/16, and EPA replied to NCG on December 6, 2016. The NCG then submitted a Notice of Dispute Resolution regarding the BERA on 12/22/16. A Dispute Resolution meeting was held in New Orleans on 1/11/17 (coincident with the Battelle sediment conference), and among the technical issues that could potentially be resolved through additional information was a request from NCG for EPA to provide additional information on a comment requiring NCG to use NYSDEC-derived water quality criteria for DDx and Aldrin/dieldrin in the Draft BERA. Anchor QEA submitted a memorandum, "Newtown Creek Baseline Ecological Risk Assessment Benthic Macroinvertebrate Risk Assessment Summary" on 2/2/17, with this request formalized. NYSDEC forwarded an email to NCG on 2/7/17, with an explanation of the WQC derivation. But during a 2/13/17 conference call, NCG requested that EPA discuss the WQC with NYSDEC. During a 2/17/17 conference call between EPA and NYSDEC, it was agreed that the NYSDEC DDx and Aldrin/dieldrin WQC values should be included in the SLERA, but that the WQC values utilized by NCG in the BERA were appropriate. However, a thorough discussion of the bioavailability of these and other bioaccumulative and persistent compounds (e.g., pesticides and PCBs) and their presence in biota tissue should be detailed in the risk characterization section. Statements indicating that only porewater contaminants are bioavailable, and that contaminants in bulk sediment are not bioavailable need to be better supported, particularly in light of the observed tissue concentrations.

We can discuss further at the wrap-up meeting today.

thanks

Caroline

Caroline Kwan
Project Manager
Special Projects Branch
U.S. Environmental Protection Agency

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(212) 637-4275
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From: David Haury [mailto:dhaury@anchorqea.com]
Sent: Thursday, March 09, 2017 4:52 PM
To: Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; ian.beilby@dec.ny.gov; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David Bridgers <David.bridgers@wallerlaw.com>; Linda Logan <llogan@anchorqea.com>
Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Stephanie – Please see the attached for the NCG's summary of the current status of the BERA dispute. We will be prepared to summarize our positions on March 14th , and address any questions and comments that arise during the meeting. We have also posted the summary to the USEPA and NYC SharePoint sites. Let me know if you have any questions on the summary. Thank you and see you next week in New York.

USEPA: BERA Dispute Resolution: Status Summary – March 7, 2017
NYC: BERA Dispute Resolution: Status Summary – March 7, 2017

David H. Haury

Principal

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From: Vaughn, Stephanie [mailto:Vaughn.Stephanie@epa.gov]
Sent: Wednesday, March 08, 2017 2:42 PM
To: David Haury <dhaury@anchorqea.com>; Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; Mehran, Reyhan (NOAA) <Reyhan.Mehran@noaa.gov>; ian.beilby@dec.ny.gov; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David Bridgers <David.bridgers@wallerlaw.com>

Subject: RE: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Hi David,

Thank you for your time yesterday.

As we discussed, the NCG will be providing a revised dispute letter which (1) briefly outlines the items still under dispute and (2) proposes language to resolve the items that are, or potentially are, resolved.

In order for EPA to be fully prepared for the in-person meeting at V&E on March 14th, we request that you submit this letter no later than noon on Friday, but preferably earlier.

Please let us know if you have any concerns.

Thanks,
Stephanie

From: David Haury [mailto:dhaury@anchorqea.com]
Sent: Thursday, March 02, 2017 11:54 AM
To: Sivak, Michael <Sivak.Michael@epa.gov>; Kwan, Caroline <kwan.caroline@epa.gov>; Schmidt, Mark <schmidt.mark@epa.gov>; Vaughn, Stephanie <Vaughn.Stephanie@epa.gov>; rweissbard@dep.nyc.gov; samron@law.nyc.gov; rayhan.mehran@noaa.gov; ian.beilby@dec.ny.gov; Mintzer, Michael <Mintzer.Michael@epa.gov>; Nace, Charles <Nace.Charles@epa.gov>
Cc: Tom Schadt <tschadt@anchorqea.com>; Jim Quadrini <jquadrini@anchorqea.com>; David Bridgers <David.bridgers@wallerlaw.com>
Subject: Newtown Creek: Further Extension of Negotiation Period for Dispute Concerning the Baseline Ecological Risk Assessment

Michael and Stephanie – I am writing in reply to the email sent by Michael to Tom Schadt and David Bridgers on February 23, 2017 clarifying the schedule for the Newtown Creek BERA dispute process (see below for the text of the email). The NCG would like to schedule a call on March 7, 2017 from 3pm to 4 pm ET to continue our technical discussions, if that day and time works for the EPA folks who are participating in the technical discussions. During that call, the NCG will discuss some of the responses provided by EPA to the NCG via email on February 17 and 20, 2017. In addition, our reading of Michael's email is that EPA would like to end the technical discussions in time for Michael to provide his final decision on the items under dispute by March 21, 2017. To that end, the NCG would like to schedule an in-person "wrap-up" meeting with EPA in the morning of March 14, 2017, assuming that Michael Sivak, and other EPA attendees are available that day. Let me know if you are available on these days and times. Thanks.

EPA is writing in connection with the dispute by the Newtown Creek Group of respondents (NCG Respondents), disputing the requirements of EPA's e-mail of December 8, 2016 which directed that Anchor, on behalf of the respondents, provide to EPA by January 23, 2017, a modified Draft Baseline Ecological Risk Assessment ("BERA") responsive in full to EPA comments transmitted by the December 8 email. This dispute was invoked by letter dated December 22, 2016 (sent to EPA by email on December 22) on behalf of the NCG respondents, pursuant to the "Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study" (AOC) at the Newtown Creek Superfund site.

By email dated January 20, 2017, EPA extended the Negotiation Period for the dispute until close of business on February 23, 2017.

Please be advised that pursuant to Paragraph 65 of the AOC, EPA has further extended the Negotiation Period for the dispute until close of business on Tuesday, March 21, 2017.

By selecting this date, EPA acknowledges ongoing technical conversations between EPA and AQ, and allows for the next technical conversation to be scheduled on or about March 7, 2017, which is two weeks after EPA's most recent submittal of information to AQ as part of these ongoing technical conversations. This date also allows for an additional call to discuss issues remaining with regard to the dispute, to be scheduled by March 14, 2017.

The dispute will also address the date required for the submittal by respondents of an approvable BERA responsive to all EPA comments. Thus, in accordance with Paragraph 66 of the AOC, respondents will be required to submit the BERA on the date determined by agreement reached during the Negotiation Period for the dispute, or failing such agreement, on the date determined in accordance with EPA's decision on the dispute.

Michael Sivak
Chief, Passaic, Hackensack and Newark Bay Remediation Branch
EPA Region 2 Superfund Program

David H. Haury

Principal

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